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Editorial

ELECTROENCEPHALOGRAPHY IN TORONTO

In 1929, Berger published the first record of the electrical activity of the human brain. The deflections were small and unconvincing and the "elektrenkephalograms" (E.E.G.) he described received little recognition until Adrian and Matthews confirmed his pioneering work in 1934. With a rapid technical advance in the necessary amplifying and recording equipment, many other workers have entered the field and are confirming and extending Berger's observations.

The first electroencephalograph in Toronto was installed in the Banting Institute in 1937. This has been used by Dr. Hall of the Department of Medical Research to study the effects of insulin, metrazol and other convulsive drugs on the brains of animals and also by Dr. Hawke of the Hospital for Sick Children to investigate the behaviour problems of children. A significant paper is expected from the latter in the near future. In 1938 a second instrument was installed close to D operating room of the Toronto General Hospital for studies on the epileptic state by Dr. Hyland and as a means of localizing brain tumors by Drs. McKenzie and Botterell. In 1939 the third machine was installed in the To-

ronto Psychiatric Hospital where Dr. Doupe is studying electroencephalography in relation to schizophrenia. It is interesting to note that by means of the E.E.G. a brain tumor was detected in a patient diagnosed clinically as a schizophrenic.

These three instruments were designed and built by J. E. Goodwin of the Department of Medical Research. They record potential changes down to one microvolt and have a frequency range of 1 to 100 cycles. The recorders are of the moving-pen type and the electrodes are small silver cups attached to the scalp with collodion.

Normal Rhythms

The fact that regular waves can be recorded suggests that cortical neurones fire off synchronously. These waves may vary in frequency, amplitude, prevalence and location.

Berger's first papers described two electrical rhythms. The first, which he called "alpha waves", and which Adrian later referred to as the "Berger rhythm", consists of recurring regular waves with a frequency of 8 to 13 per second ("10 per second waves"). These are recorded only when the eyes are shut and are abolished by visual activity or mental effort.

Although the alpha discharge is by far the most prominent feature of the normal E.E.G., Berger also has described a beta rhythm consisting of waves with a frequency of 18 to 30 per second with an average rate of 22.

The alpha and beta rhythms are the only discharges recordable from the healthy waking human brain, although during sleep large delta waves (3 to 6 per second) appear over the whole head.

Pathological Variations

Tumors involving the cerebral cortex and the epileptic state are the two clinical conditions in which abnormal waves are most consistently recorded.

1. Cerebral tumor. The new growth is electrically inactive and from the more normal adjacent cortex a delta discharge (3 to 6 per second) originates. By determination of the focus of the delta waves, the tumor may be localized to within 1 cm. or so. About 3% of cerebral tumors show no abnormality in the E.E.G. The tumors in these cases have been either small meningiomata or astrocytomata. A delta focus has been found in a few cases of cerebellar tumor.

2. The epileptic state. Seizures involving cortex are accompanied by characteristic fluctuations in the E.E.G. The rhythm is distinctive for the three main types of epilepsy. *Grand mal* is characterized by an accelerated rhythm, *petit mal* by an alternating fast and slow rhythm and *psychomotor attacks* show a slowing of all cortical activity. The accelerated rhythm of grand mal commences several seconds before the earliest clinical signs so that it is possible to predict a seizure in advance. Preceding the gross abnormalities of rhythm is a lack of control of cerebral discharges which has led Gibbs, Gibbs and Lennox to a new concept of epilepsy as "a paroxysmal cerebral dysrhythmia". Some workers claim to have localized the focus of the abnormal rhythm in cases of grand mal to the region of the superior frontal gyrus and report clinical improvement in two cases out of three on whom a frontal lobectomy was performed.

Hysterical attacks are not associated with any abnormalities in the E.E.G. Electroencephalography is therefore of use in differentiating atypical hysterical attacks from true epileptic seizures.

Apart from cerebral tumors and epilepsy, the E.E.G. at its present stage of development is of little practical value in the investigation and diagnosis of diseases of the brain. Neuroses and psychoses of unknown etiology have been thoroughly studied by electroencephalographic methods but no definite or characteristic abnormalities have been detected.

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SIGMUND FREUD
1856-1939

By C. B. FARRAR, A.B. Harv., M.D.J.H.U., F.R.C.P. (C.)
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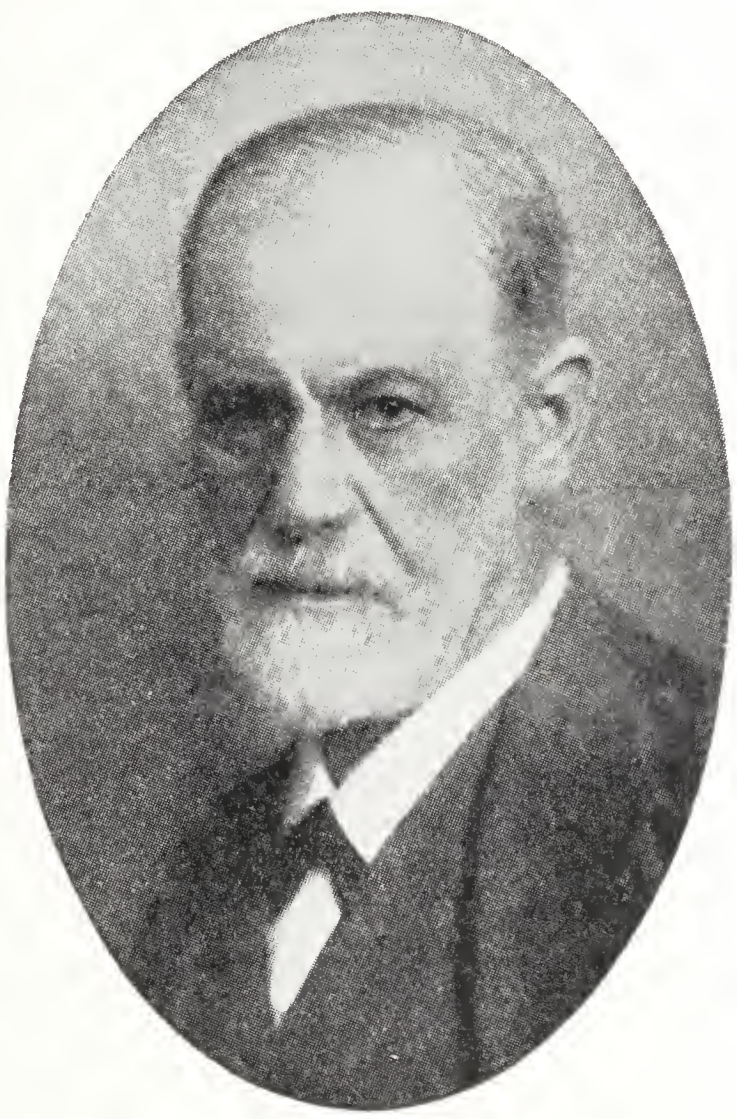
Probably the most discussed, the most worshipfully adored, the most violently criticized scientist of this generation was Sigmund Freud. At his death all commentators unite in acknowledging his genius and his greatness; among them his followers pay the homage of disciples for the master, others qualify their tribute by such phrases as,—"Whatever may be one's views as to his theories."

It was in the early nineties that Freud laid the foundation of his system of psychoanalysis—metapsychology he later called it, and the sweep of his doctrines through the minds of his contemporaries has been nothing less than sensational. To-day, after nearly half a century of debate, the smoke of battle has somewhat subsided but the issues are by no means finally resolved.

With respect to their attitude towards Freud's teachings, students of the mental sciences might be grouped into four classes. First, there are the Freudians proper, those faithful disciples who accept the words of the master with almost religious devotion and whose opinions have changed as he changed his. Second, there are the sectarians. These are those who started out as orthodox Freudians, some of them belonging originally to the inner circle, but who have split off in various directions, setting up denominational schools of their own, denying the validity of this or that fundamental tenet of psycho-



Sigmund Freud

analysis, thus on occasion invoking the master's repudiation of an ex-disciple as a heretic. Examples are Adler, Steckel, Jung. Both these groups contain the exponents of psychoanalysis in its various forms or derivatives. In the third group may be found the non-practitioners or non-adherents of the Freudian system who feel nevertheless that they have profited in greater or less degree by its teachings and may accept some of its principles. This group, which without question is a large one, may be likened to those whom Sir William Osler, in his classification of religious attitudes, referred to as the Laodiceans,—"neither hot nor cold, but lukewarm." Here too may be ranged many who, impressed by the esoteric diction of psychoanalysis and a little bewildered perhaps by its authoritarian declarations, feel that to be up to date they should not dissociate themselves from the Freudian vogue, much as the gallery-goer may profess interest in the productions of Kandinsky to conceal the fact that he can make nothing of them. Finally there is the fourth category represented by those who after forty-odd years remain unconvinced of the soundness of psychoanalytic doctrine or of its value as a therapeutic procedure or reject it altogether.

The violent antithesis of opinions, as pronounced to-day as forty years ago, is illustrated by two quotations in Bing and Haymaker's *Textbook of Nervous Diseases* (1939). On the one hand there is the opinion of Robert Scheu that the doctrine of Freud has become an "integral part of modern thinking." On the other hand Paul Hartenberg views this same doctrine as "a fabric of mistakes, obscenity and stupidity."

While we must therefore keep the record straight, namely that Freudian teaching, the protests of protagonists notwithstanding, has in no wise gained the almost universal acceptance they would have us believe, it is nevertheless perfectly clear that Freud's influence upon his generation has been profound. In his book *Mental Healers*, Stefan Zweig discussed Mary Baker Eddy and Sigmund Freud in adjoining chapters. The juxtaposition was not wholly inappropriate in that both these leaders initiated movements which have swept over the contemporary world, and that both partake of the nature of religious cults.

In his frank *Autobiography* (1925. Revised edition, 1935) Freud furnishes the clues to his scientific career, his personal attitude to his theories and his manner with students who differed from him. Frustration and non-acceptance were his lot from the first. When he went to the university at the age of 17 he was at once aware that he was regarded as an "inferior and an alien" because of his race. When at 30 he reported to the Vienna Medical Society upon his Paris visit and the work of Charcot he "met with a bad reception." His views of male hysteria were greeted with ridicule, he was excluded from the laboratories and could not secure a lecture room. "I withdrew from academic life and ceased to attend the learned societies. It is a whole generation since I have visited the Medical Society."

And so it continued. Breuer, with whom he had collaborated in *Studien über Hysteria* (1895), thereafter dissociated himself from Freud. The latter, now in his forties, pursued his solitary way. His papers before medical societies "only met with incredulity and contradiction." For more than a decade he was completely isolated. "In Vienna I was shunned, abroad no notice was taken of me." Freud was 50 or a little more when Bleuler and Jung began to interest themselves in psychoanalysis, starting a discussion which soon spread over Germany. But fate was still unkind. "After the briefest acquaintance with psychoanalysis, German science was united in rejecting it." In the *Autobiography* Freud refers to the "conscienceless contempt of logic" of his German critics. His comment upon his reaction to his American visit (1909) is significant. "In Europe I felt as though I were despised, but in America I found myself received by the foremost men as an equal."

Now in his sixth decade Freud was finding recognition for the first time, but it is not surprising that this could not neutralize the bitterness that had already entered into him. From the self-revealing of his comments here quoted

it is not difficult to understand how he devoted himself to the building and fortification of his system with the single purpose and zeal of the prophet. Freud was psychoanalysis and psychoanalysis was Freud. "Psychoanalysis came to be the whole content of my life." As disciples belatedly gathered, the master's word assumed a note of infallibility. Dissent was not to be thought of. They might follow his change of opinion but initiate none of their own. But independent thinking could not be entirely suppressed. When two of the original members of the inner circle, Jung and Adler, departed on their separate ways they became for Freud "the two heretics." He insisted that they should cease to describe their theories as "psychoanalysis."

The precedent of civil war arising within the first small Freudian group has since been followed; and while there have been orthodox analysts true to the teachings of the master there have been others who have evolved independent theories and methods which contradicted his doctrine in its most vital points. The designation "psychoanalyst" has come however to have a certain prestige, not to say commercial, value and the heretics insist for the most part on retaining it.

What will be the place of Freudian theory in the mental sciences of fifty years hence must remain a question for the historian of that day. That Freud has left his mark upon these sciences even those who disallow the validity of his principles would be loath to deny. There would doubtless be general agreement, first, that Freud has contributed essentially to breaking down the sex tabu of the last preceding generations, although in that service Havelock Ellis played as important but a less sensational role. Freud made sex if not respectable at least popular, indeed he and his followers egregiously overpopularised it. They turned the mauve decade into a definitely purplish twentieth century. Second, that the emphasis on psychogenesis implicit in Freud's work was valuable among the influences which were gathering to divert men's minds from the too rigid materialistic science of the nineteenth century. Third, that his doctrine of psychic determinism, though perhaps extreme, has helped to an understanding of the data of psychopathology which superficially may appear bizarre or haphazard, and has thus stimulated fruitful study of the content of the psychosis.

These are not inconsiderable contributions, even though the stones which are now the heads of the corners of the Freudian structure may be rejected by the builders of the future. The descendants of the psychoanalysts of to-day will perhaps suffer less from the nightmares of "repression", they may be less painfully conscious of their "unconscious", Oedipus Rex may no longer be the bogeyman of childhood, and it may be hoped that the analysis of children as carried on by certain ruthless enthusiasts to-day may fall into disfavour and cease to be.

Its very nature made it inevitable that psychoanalysis should be exploited in many spheres of human interest, nor always with unqualifiedly happy results. Against it must be charged many of the vagaries and excesses of contemporary literature and much that is worst in modern art. It has engendered not a little charlatanism in the practice of healing. None the less it is good that the phenomenon Freud occurred. He has been an exciting and intriguing experience for the world. He focussed attention extraordinarily upon the meticulous and detailed study of the psychic happenings as such, and his shrewd insights have contributed to their elucidation.

SAPHENOUS VEIN VARICES

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Varices of the legs have attracted the attention of those interested in medicine and surgery since early times. Hippocrates wrote of the condition several centuries B.C. Interest has centred particularly on treatment and many methods have been advocated. In recent years injection therapy has come to the fore and apparently is here to stay. It is, however, not as recent an innovation as we might think. It was first suggested in Europe, shortly after the introduction of the syringe. Thus in 1853 there are recorded attempts to inject varicose veins with perchloride of iron. Many other solutions were tried during the years to follow, but infection was always a dreaded factor. It is proposed in this paper to discuss briefly several aspects of the lesion and outline the modern method of therapy.

Aetiology

While the basic cause of varicose veins is unknown, numerous factors are known which do play a part. The lesion seems to occur in certain families more frequently than in others. Whether there is an inherited defect in the venous wall or not is another unknown point.

Pressure from tight garters, pelvic tumour, or pregnant uterus favours the production of the lesion.

Inflammatory lesion of the deep veins of the leg may result in superficial varicosities, which persist after recanalization of the deep veins, e.g. phlegmasia alba dolens.

Any occupation, which necessitates prolonged standing without moving about, seems to be a factor in producing varicose veins.

The ductless glands have come in for a share of the blame. The exact mechanism by which they produce the effect has not been revealed, but the statement is made on the basis of the frequent appearance of the condition just after puberty and during pregnancy.

Signs and Symptoms

The clinical aspect of the lesion is not a difficult one to remember. The appearance of the varices themselves, a heavy feeling and easy tiring in the affected limb form the main, and practically the only points. These are usually followed by the appearance of oedema.

Still later a dermatitis appears in the skin of the involved limb. It is apparently the result of impaired venous return. Ulceration not infrequently follows the appearance of the dermatitis and forms the major complication of varicose veins in the leg. Another occasional complication is haemorrhage.

Recurrent inflammation is a not infrequent complication of varicose veins of the leg. Such phlebitis may occur as a localized patch along the vein, or, occasionally the entire varix is involved. As the lesion is quite painful, bed rest is an essential of early treatment. Once the pain is gone such patients may be allowed up, and not, as was formerly taught, kept in bed for six weeks, provided the temperature is normal.

Tests

There are many tests described for the determination of the exact structural changes present. Two only seem to be of practical value. First in importance, as well as age, is Trendelenburg's test. The patient's leg and thigh are bared to the groin. With the patient lying on his back, pressure is applied over the upper end of the long saphenous vein. The patient then rises and while watching the vein closely, pressure is suddenly removed from its upper end. If filling occurs quickly from above, the valve at the upper end of the long saphenous vein is incompetent.

The second test simply consists in stripping the vein while the patient is standing and noting from which end the filling is more rapid. If from above, the

flow must, therefore, be the reverse of normal and the vein varicose.

Treatment

For the purpose of treatment, varices of the legs can be divided into two main groups: (1) those involving the long saphenous vein on the thigh and (2) those occurring below the knee only.

The first group are best treated by ligation of the long saphenous vein at the fossa ovalis, together with the main tributaries at this point. It is wise to excise a piece of the vein and thus make sure that continuity cannot be restored. Into the distal portion of the vein 3 c.c. of soricin or sodium morrhuate are injected. The operation and injection usually keep the patient in bed for twenty-four hours. In many cases no further therapy is required, but some need further injection.

For those varices which occur wholly below the knee, injection therapy has proved the safest, and the least disturbing to both doctor and patient. Sodium morrhuate (5 and 10%) and soricin (5%) are two of the sclerosing agents most commonly used. Injections are best carried out at weekly intervals, using from 1 to 2 c.c. of fluid at each injection, and never giving more than one injection in each leg at each visit. Although it does not matter where the injection is given—as long as it is into the vein—it would seem reasonable to start with the highest vein. The patient should preferably be sitting with the leg supported almost at right angles. There will then be sufficient venous pressure to make introduction of the needles easy, and yet not enough to force fluid out of the vein, as may happen if the injection is done with the patient standing. Following injection a small pad is fastened firmly over the site by means of adhesive. It is removed by the patient the next morning.

Treatment is continued until all varices are obliterated. The patient should be instructed to return in three months for re-check, and if free then, six months later.

Conclusions

Varices of the long saphenous vein are common. Their true cause is unknown. Various aetiological factors have been pointed out. Therapy which can be carried out with a minimum of difficulty to patient and doctor, and which results in a minimum number of recurrences has been described.

"ON THE MANNER IN WHICH DIGESTION IS PERFORMED IN THE HUMAN STOMACH"

"The ancient doctrine of attrition was received, and acquired new force from the character and calculations of the celebrated Pitcairn; he computed the muscular force of the stomach alone, to be equal to a weight of above 100,000 pounds; and when the force of the diaphragm and abdominal muscles is included, to a pressure of about 250,000 pounds weight, . . .

. . . Had the human stomach seemed better formed for such purposes; and had its triturating power been calculated at even an higher rate by mathematicians, still it would have been evident that it performed no such function; for currants and even ripe grapes, which burst on slight pressure, when swallowed entire, are often voided unbroken. This observation made by men of no vast extent of genius or algebraical knowledge, and which in itself is not of the most refined nature, at once overturns the theory of trituration, with all the calculations which supported it, and shews to what height of error men of greatest learning, and acuteness may build, when they found upon a false hypothesis."

Medical Sketches: In two parts,

by JOHN MOORE, M.D.

(Clifford-Street, April 15, 1786)

PARKINSONISM

By J. C. RICHARDSON, M.D., B.Sc.(Med.), M.R.C.P.
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In a brief essay written in 1817, James Parkinson drew attention to a condition characterized by a combination of tremor and "weakness", which he termed "shaking palsy" or "paralysis agitans". He described seven cases aged from fifty to seventy years in which there was a common type of slowly disabling disease manifesting itself by difficulty in walking, impaired use of the hands and, later, difficulty in talking and eating. Parkinson noted chiefly the constant type of "tremulous agitation" of the limbs, the stooped posture, and the tendency to walk at a hurried pace. This report achieved its stated purpose of bringing recognition of a clinical entity and of stimulating subsequent clinical and pathological interest. His apologetic speculations as to the cause of this disorder are of interest. "By the nature of the symptoms we are taught that the disease depends on some irregularity in the direction of the nervous influence; by the wide range of parts which are affected, that the injury is rather in the source of this influence than merely in the nerves of the parts." He goes on to suggest that, because of the situation of the affected parts and because of the absence of injury to the senses and intellect, the "encephalon" is not affected and that the medulla spinalis is probably the site of the disease.

Later in the past century and until the present time, more detailed observations have added many finer clinical distinctions to an appreciation of paralysis agitans. New conclusions were reached as to different aetiological types. Pathological findings have become a little more instructive, tending to implicate structures of the basal ganglia as the site of disease. Physiological interpretations of the signs of the disease have been a notable contribution to our limited knowledge of the function of the basal ganglia. In recent years an important practical observation has been that certain drugs of the atropine series are often effective in alleviating the symptoms.

In this short article it is not intended to consider in detail all these aspects of Parkinsonism. It may be helpful to describe the characteristic features of the disease, to outline the general clinical and pathological conceptions of Parkinsonism, to specify the various types and to discuss treatment.

General Appearance in Paralysis Agitans

An advanced case of *idiopathic paralysis agitans*, such as those which aroused Parkinson's interest, can be recognized at a glance by its characteristic general appearance. Such a patient is a little more likely to be a man than a woman, and an average age would be fifty-five years. He is standing in a markedly stooped posture and one is struck by his fixed, smooth facial expression. His rigid posture is relatively immobile except for a rapid, uncontrollable tremor of his flexed arms and hands. When asked to walk he delays and seems to have difficulty in getting started. The gait is one of short, shuffling steps; it may be slow and cautious or he may take very quick steps as if forced to break into a run to keep from falling forward (festinant gait). It is difficult for him to stop so that it may take several steps and the support of a nearby object to bring him to a halt (propulsion). A gentle push on his chest starts the patient in rapid steps backward and he nearly falls (retropulsion). When he turns around he does so like a solid pillar; lacking the usual flexibility of neck and trunk, there is not the preliminary torsion of head and shoulders as when a normal person turns about. A characteristic and often early sign is the absence of swinging of the arms when walking. Some such patients who can walk only with great difficulty are able to run much

better and even to jump over obstacles (kinesis paradox).

The face of a patient suffering from paralysis agitans is flushed and oily from excessive sebaceous excretion. There is a staring appearance because of infrequent blinking of the eyes (reptilian stare). The skin is smooth, with few furrows, and changes of facial expression are infrequent and slow (mask-like face, lingering smile). The fixed expression is often one of profound calm or of anxious helplessness, and it is incorrect to speak of it as an expressionless face. Though the facies has been termed the "Parkinsonian mask", it is of interest that Parkinson made no mention of the facial changes. Often there is a troublesome drooling of saliva at the corners of the mouth or over the chin (sialorrhoea).

Neurological Examination

All of the above diagnostic signs have been apparent on general inspection. Detailed neurological examination elaborates these signs and elicits further information, particularly in regard to the motor function and the tremor. The patient's intelligence, memory and judgment remain strikingly normal. There may be considerable despondency and irritability, a readily understandable emotional reaction to such a disabling, helpless condition.

In examination of the cranial nerves, a characteristic finding is marked limitation or absence of ocular convergence. The pupils are normal and other ocular movements are normal. Some degree of retraction of the upper eyelids may be present to add to the staring appearance already referred to. Facial movements performed on request, as well as emotional expressions, take place very slowly and relaxation to the former smooth, rigid expression is slow. There may be a to and fro coarse tremor of the tongue (trombone tremor). There is no actual paralysis of any cranial nerve.

The most characteristic signs are elicited on examination of the motor functions. As suggested by Walshe, Wilson and others, it seems that with a few possible exceptions, all the signs of Parkinsonism can be attributed to two primary defects, muscular rigidity and tremor. A generalized muscular rigidity, as evidenced by increased resistance to any passive movement, is present. Movements of the head in any direction, including rotation, demonstrate marked stiffness throughout the neck muscles. The resistance encountered differs from the neck stiffness of meningitis in which only the posterior cervical muscles are rigid and in which it is usually impossible to overcome the rigidity passively. The trunk shows a rigidly flexed posture. With this rigidity of the neck and trunk, the patient may assume postures which appear most uncomfortable. Thus, he may lie with his head raised as if supported in mid air by a "psychical pillow." Even more striking, his trunk may be held for some time in an oblique half-sitting, half-prone position. The characteristics of muscular hypertonicity become most evident on examination of the limbs. The upper limbs are held in a position of flexion at all joints except the fingers which are straight and adducted (writing posture). Passive movements at the elbow, wrist or knee show that flexion and extension are equally resisted and the same rigidity is felt throughout the movement. This has been aptly described as a plastic, lead-pipe or waxy rigidity. It is the so-called extrapyramidal rigidity and is in direct contrast to the spasticity produced by interruption of the pyramidal tracts in which the rigidity is selective, involving the flexor muscles of the arms and the extensor muscles of the legs. Pyramidal rigidity, moreover, is not constant throughout the movement, but is released during passive manipulation, producing the "claspknife" phenomenon. In some cases of Parkinsonism there is a modified form of extrapyramidal rigidity in which the resistance is intermittent and jerky, as though the tense muscles were undergoing rhythmic relaxations throughout its forced stretching (cog-wheel rigidity).

Volitional active movements are very infrequent, slow and limited in range. This poverty of movement adds to the statuesque, immobile, general appearance.

When the patient is carrying out some requested movement, such as touching his nose with his hand, there is delay in initiating the movement and it is performed very slowly. There is no incoordination.

In testing muscular power, it is found that maximum strength is reached slowly but when achieved there is little or no weakness. There is no muscular wasting. The handwriting is characteristically very minute (micrographia) and may show irregularities due to the tremor.

The tremor most commonly affects the limbs and most frequently starts in the hands. As in the tongue and jaw, this is a rhythmical to and fro movement at about the rate of 200 per minute. When fully developed in the upper limb, the Parkinsonian tremor is highly characteristic. There is a flexion-extension movement of the fingers and thumb and this, combined with the writing posture, produces the familiar "pill-rolling" appearance. There is also a coarse, flexion-extension movement of the wrist and elbow, usually with some superimposed supination-pronation. The tremor is present at rest (tremor coactus) in contrast to the intention tremor of cerebellar disease. The tremor may be constant or only intermittent but tends to vary under different circumstances. Any strong emotion such as excitement or apprehension tends to aggravate the movement. During voluntary effort by the tremulous part, the tremor usually becomes less or may subside. This is not always so, however, and in some cases the tremor remains constant throughout the volitional movement. Tremor in the lower limbs consists mainly of a flexion-extension at the ankle; when severe there are movements at the knees and hips also. Tremor of the head and trunk are uncommon.

The above description applies to the fully developed case in which the motor symptoms are widespread throughout the body. Symptoms commonly commence in one arm, then spread to the other arm or to the ipsilateral leg. For a long time the signs may be restricted to the one arm and leg (hemiparkinsonism) and the condition must be distinguished from hemiplegia.

The tendon reflexes remain unaltered and there is no impairment of any form of sensation. There is no related disease of other systems with the exception of some secondary joint changes. The blood pressure may be normal and there are no signs of undue arterial thickening nor of cardiac disease.

Types of Parkinsonism and Pathological Remarks

By Parkinsonism or Parkinsonian Syndrome is meant the clinical picture described above. The outstanding general features are the paucity and slowness of movement, the fixed, smooth facies, the attitude of flexion, the characteristic tremor and the shuffling, festinant gait. The basic signs are the plastic or cogwheel rigidity and the characteristic tremor.

The modern conception of Parkinsonism is that of a clinical syndrome which may be caused by several different disease processes. It seems that the more or less constant clinical picture is due to a common involvement of corpus striatum and/or substantia nigra by these various pathological processes. Thus, one speaks of arteriosclerotic, senile and post-encephalitic Parkinsonism and of Parkinsonism caused by tumors and by chemical poisons. Delimited by exclusion of these known types, by certain of the clinical features, and also by its fairly distinct histopathology, there remains the type of idiopathic Parkinsonism, known also as paralysis agitans or Parkinson's disease. In this sense also one may speak of the last group as true or primary Parkinsonism and the others as symptomatic or secondary Parkinsonism. In reserving the terms Parkinson's disease and paralysis agitans for the idiopathic, primary type, one is following precedent and it seems fairly logical. In the cases which Parkinson described originally, the ages, the signs described and the course of the disease suggest that they were probably all of the primary type though some may

have been caused by cerebral arteriosclerosis.

1. **Idiopathic Parkinsonism:** In this brief review, true paralysis agitans has already been described in some detail. It is an isolated, pure Parkinsonian syndrome developing usually between the ages of fifty and sixty. The symptoms tend to be slowly progressive. There is no evidence of any associated causative disease such as arteriosclerosis or infection.

Pathological examination of the brain in paralysis agitans usually shows no gross abnormalities. At the time of Charcot the disease was spoken of as a neurosis, in the sense that there was then no demonstrable organic lesion. Since then, however, it has been shown repeatedly that there are constant microscopic degenerative changes in the basal ganglia. The histopathology is not entirely elucidated but the most constant finding is chronic nerve cell change with some loss of cells in the corpus striatum. The large type of nerve cells seems particularly affected and the most marked change is in the globus pallidus or paleostriatum. For this reason the clinical state has been spoken of as a pallidal syndrome. There may be some gross shrinkage of the pallidum. The arteries at the base of the brain and the small vessels in the basal ganglia show no constant change and frequently are normal in appearance.

The cause of paralysis agitans is unknown. It has been suggested that it is a localized aging process, a limited viability of the striatal cells causing them to undergo a premature senile degenerative change.

2. **Symptomatic Parkinsonism:** The symptomatic varieties of Parkinsonism will now be dealt with very briefly. All of these types show certain of the requisite signs of Parkinsonism. There are clinical differences, however, which usually distinguish the various groups.

Post encephalitic Parkinsonism in contrast with true Parkinsonism tends to show marked rigidity and less tremor. There is usually a history of acute encephalitis lethargica and, since the epidemic years (1919-1927) there have been only a few sporadic cases. The age incidence is wide and many cases have occurred among children and young adults. Added oculomotor signs, such as oculogyric crises, pupillary changes and blepharospasm, are characteristic. Many cases show mental changes.

Pathological studies during and since the epidemic of encephalitis lethargica have shown that postencephalitic Parkinsonism is caused by destruction of the melanin-containing cells of the substantia nigra. Certain evidence suggests that the disease lingers in that part of the brain after it has died out elsewhere. The substantia nigra is probably very closely related to the pallidum anatomically and physiologically. Similar nerve cell loss occurs in the cerebral cortex and in other parts of the brain, explaining the other neurological manifestations. There is a characteristic but less important perivascular infiltration of round cells.

Arteriosclerotic Parkinsonism may be difficult to distinguish from idiopathic Parkinsonism as the difference is not sharply defined. However, the arteriosclerotic type tends to occur in an older age group—sixty to seventy years—with the exception of hypertensive cases which may develop Parkinsonism before the age of fifty. The rigidity is more striking than the tremor. The condition may progress steadily or in abrupt steps due to added cerebral vascular accidents. There are usually signs of peripheral and retinal arteriosclerosis. Often there are superimposed neurological signs, such as residual hemiplegia. Motor function tests usually elicit certain added semivolitional characteristics: the patient seems over-anxious to cooperate, moves his limbs excessively and relaxes poorly. Often there is an emotional lability, and facility of emotional expression, producing ready laughter and tears. With cerebral arteriosclerosis, Parkinsonism may be an outstanding and progressive feature, or may be merely a less significant syndrome occurring amongst several other clinical manifestations of cerebral vascular disease. Critchley has published

an exhaustive study and review of arteriosclerotic Parkinsonism. In regard to symptomatic Parkinsonism in general, he states: "The more detailed the clinical examination and the closer the study of the disease the narrower becomes the category of 'idiopathic' paralysis agitans."

Pathologically, there are apparent macroscopic changes, unlike primary paralysis agitans. The cerebral arteries show gross arteriosclerotic changes. Usually the brain is reduced in weight. There may be scattered ischaemic and haemorrhagic foci. Microscopically there usually is some fibrosis and narrowing of arterioles and capillaries. Almost invariably changes are found in the basal ganglia, particularly in the pallidum. As well as degeneration and loss of nerve cells, there is considerable gliosis and small vessel thickening. Medial deposits of iron and calcium in the pallidal arteries occur so commonly in all elderly persons that this finding is of no related significance.

Senile Parkinsonism: Very old persons nearly always show a stooped posture, poverty and slowness of movement, and often some muscular rigidity and tremor. These changes probably are mainly due to senile atrophy of the basal ganglia. Changes in joints, ligaments and muscles may add to the posture and attitude of the aged. More severe Parkinsonism of the aged is said to occur usually when the senile changes in the brain are accompanied by considerable cerebral vascular disease. Occasionally one sees Parkinsonism in association with senile dementia, a condition known as Jakob's disease. Such cases show chronic nerve cell changes in the basal ganglia as well as the typical senile degeneration with senile plaques in the cerebral cortex.

Syphilitic Parkinsonism is a relatively uncommon disease, the symptoms and signs of Parkinsonism developing in an individual with other signs of neurosyphilis. Described as mesencephalitis syphilitica by Wilson and Cobb, it is related to syphilitic vascular lesions in the basal ganglia.

Parkinsonism in cases of cerebral tumour: Unilateral and bilateral signs of Parkinsonism have been seen, not infrequently, in cases of infiltrating glioma involving the basal ganglia.

Parkinsonism due to cerebral trauma has been described as a sequel to head injuries causing damage to the paleostriatum. The clinical picture is varied and atypical. The state of "punch drunk" in boxers may be accompanied by some degree of Parkinsonism. The onset of symptoms of true paralysis agitans has been related to cerebral trauma in a few incidences and is a debatable problem of some medicolegal importance.

Parkinsonism caused by toxic substances: In rare instances Parkinsonism has been found to develop following intoxication by carbon monoxide, carbon bisulphide, manganese, hydrocyanic acid, salvarsan, veronal, alcohol and phosphorus. The syndrome also has been described as a sequel to intensive exposure to therapeutic doses of radium to the face. Carbon monoxide poisoning probably is the commonest and clearest example in this group. It is well known that carbon monoxide has a particular effect on the globus pallidus and, in fatal carbon monoxide poisoning, there often is seen a severe bilateral softening of the pallidum.

Closely allied to these conditions causing Parkinsonism are several other developmental and familial disorders. They are probably associated with changes in the striatum and subthalamic body rather than in the pallidum and substantia nigra. They tend to show similar extrapyramidal rigidity but different kinetic phenomena. As such, may be mentioned Wilson's disease (hepato-lenticular degeneration), torsion spasm, Westphal-Strumpell's disease and athetosis.

Morbid Physiology

This most interesting aspect of Parkinsonism will receive only brief mention here. Attempts at physiological interpretation of the symptoms have provided a great deal of speculation as well as reasonable and valuable information as to striatal functions. The tremor and rigidity of Parkinsonism are striking examples of

"release" phenomena as postulated by Hughlings Jackson. Thus we must remember that if the symptoms are due to loss of pallidal function, the tremor and rigidity are actually produced by a complex, deranged functioning of the various remaining parts of the central nervous system,—cerebral cortex, cerebellum, red nucleus, etc. From that it is seen how physiological speculations from individual symptoms may be decidedly erroneous. The pallidal and striatal structures have numerous afferent connections and from the pallidum, efferent fibres run to the red nucleus from which extends the important motor rubrospinal tract. It is probable that these structures are part of a secondary, reinforcing motor system. Disease of related parts of the basal ganglia will release disordered motor functions which may actually be produced at different levels and combinations of levels in the motor nervous system. The rigidity and tremor are probably widely different symptoms physiologically. There is some evidence that the rigidity is dependent upon proprioceptive impulses, thus being an unrestricted proprioceptive reflex similar to pyramidal rigidity. The tremor has been likened to the interrupted nature of a normal, slow, voluntary movement as seen with very slow flexion of a finger. This irregularity of slow muscular movement occurring in healthy persons is probably due to a normal rhythmical discharge of nerve cells, possibly in cerebral cortex. Parkinsonian tremor is said to be an exaggerated, uninhibited form of this normal rhythm, due to impaired function of lower motor centres. Cog-wheel rigidity would seem to be of the same physiological significance as the tremor. In this regard I would recommend to the student that he read Walshe's lectures on "Disorders of Movement" published in the *Lancet*, 1929.

Treatment

There is no known cure for Parkinsonism with the possible exception of a few rare cases caused by tumour or syphilis. The common primary, arteriosclerotic and post encephalitic forms of Parkinsonism usually show a prolonged, slowly progressive course over a period of many years. Throughout such a long chronic illness, proper medical treatment is very valuable. Certain drugs to be mentioned have definite and often striking effects in relieving and decreasing the symptoms. Stramonium, hyoscine, belladonna and atropine have similar effects and owe their efficacy mainly to their power to diminish the extrapyramidal rigidity. In some few cases the tremor also is somewhat reduced. The action of each of these drugs varies to some degree in individual cases so that it is often necessary to try several until the most suitable is found. In all, the method of administration is to increase the dosage gradually until a maximum effect is attained, then to continue with that amount which is usually far above the pharmacopoeal dose. Some physicians advise increasing the dosage until toxic symptoms develop, then slight reduction determines the optimum dose. Early, mild, untoward effects common to all are blurring of vision from paralysis of accommodation, and dryness of the mouth. These signs do not indicate any reduction of dosage. Decreased salivation is, to a point, advantageous in overcoming the sialorrhoea. Blurred vision, with difficulty in reading, is easily remedied by suitable glasses. Both can be minimized by prescribing in addition, pilocarpine nitrate, 1/15 to 1/10 grain, three times daily. More severe toxic symptoms, such as vertigo, palpitation and vomiting, tend to subside readily with reduction of the amount of the drug Later, it usually may be increased again. Sometimes, however, it is necessary to discontinue, then alter the medication.

Stramonium is usually given as the tincture. Starting with 10 minims, three times a day, it may be increased by 1 minim daily or by 5 minims every three or four days. The optimum dose varies between 25 minims and 1 dram three times daily. Stramonium may also be given as the powdered leaf.

Tincture of belladonna administered similarly has found less general favour. A few years ago continental writers described striking results with Bulgarian

belladonna, but controlled experiments have failed to show any definite superiority over other varieties of fresh belladonna.

Hyoscine usually is administered as tablets by mouth and is a widely favoured remedy. In most cases 1/75 to 1/50 grain, three times a day—a dose reached gradually—is well tolerated.

High dosage of atropine has proved very valuable in some refractory cases, particularly in post encephalitic Parkinsonism. Atropine sulphate is made up in fresh dilute solutions and drop doses, starting at 1/150 grain, can be slowly increased. Surprisingly, doses of ⅛ and even ¼ grain of atropine sulphate three times a day often are well tolerated in these cases. When the optimum dose is reached the drug may be made up in pills of that size for the individual patient.

Benzedrine sulphate has been found to be of distinct value in some cases. In the form of 10 mgm. tablets given at morning and noon it has a definite effect in alleviating feelings of fatigue and depression, but it has little, if any effect on the muscular rigidity. Benzedrine has been found to decrease the number and severity of oculogyric crises.

The general management of a sufferer of Parkinsonism is almost as important as the drug therapy. The environment and activities of the patient should be considered in every detail. He should not be confined to bed except in very advanced stages of the disease. He should be encouraged and reassured, his interests kept up and, as long as possible, customary activities should be continued. Courses of physiotherapy, in the nature of baths, massage and passive movements, are often of decided benefit.

Pages from the Past

THE ILL EFFECTS OF LOITERING A BED IN A MORNING, AND THE ADVANTAGE OF RISING EARLY

"Nothing can be more prejudicial to tender Constitutions, studious and contemplative Persons, than lying long a Bed lolling and soaking in Sheets, any time after one is distinctly awake, or has slept a due and reasonable time: It necessarily thickens the Juices, enervates the Solids, and weakens the Constitutions. A free open Air is a kind of a cold Bath, especially after rising out of a warm Bed; and consequently makes the Circulation brisker and more compleat, and braces up the Solids, which lying a Bed dissolves and Soaks in Moisture. The erect Posture, and the activity of watching, make the Perspiration more plentiful, and the gross Evacuations more readily thrown off. Add to all these the influence of the fresh, benign, Morning Air, the retreating of all the Noxious Damps and Vapours of the Night, together with the Clouds and Heaviness, that are thrown upon the Brain from Sleep; and lastly, that Chearfulness and Alacricity that is felt by the Approach or Presence, of that glorious Luminary the Sun, which adds a new Force to the Heart, and a Spur to the Spirits."

An Essay of Health and Long Life, by George Cheyne, M.D., F.R.S. Printed for George Strachan, at the Golden Ball over against the Royal Exchange in Cornhill; and J. Leake, Bookseller at Bath. 1725.

A PROBLEM IN DIAGNOSIS

SUMMARY OF CLINICAL FINDINGS

By J. R. F. MILLS, M.D., M.S.

This patient, a 71-year-old married white female, was admitted to hospital on December 7th, 1939.

One year previously, she had an attack of moderately severe, epigastric pain with vomiting, lasting four days. She had been well subsequent to this attack, apart from some fullness and belching after meals, until four days prior to admission, when following her noon meal, she developed sudden severe pain in her epigastrium shortly accompanied by vomiting. The pain remained very severe for two hours and then became generalized, dull and aching in character and persisted until admission. The vomiting continued unabated, but the vomitus was not remarkable. The patient did not have a bowel movement for six days except one following an enema the day prior to admission.

Examination

The patient was a very obese elderly female who appeared quite ill. She had slight cyanosis of her lips and ears.

Chest: A few crackling rales were heard at both lung bases and some fluid was present at the left base.

Cardiovascular: B.P. 160/95. Pulse 108. Patient was quite dyspnoeic even in the orthopnoeic position. No peripheral oedema was evident.

Abdomen: The abdomen was distended and tense with some bulging in the flanks. There was shifting dullness and it was felt that there was a moderate amount of free fluid in the peritoneal cavity. No intestinal sounds were heard on auscultation. No masses could be felt. The whole abdomen was quite tender but the maximum tenderness was in the epigastrium.

Rectal and vaginal examinations were not remarkable.

Temp. 101° F. (per Rectum) W.B.C. 23,000. Chemical analysis of the gastric contents was positive for blood. A specimen of urine could not be obtained.

Progress

In spite of intravenous glucose and stimulants, the patient's condition gradually became worse and she died nine hours following admission. At no time was her condition such as to warrant exploration.

SUMMARY OF AUTOPSY FINDINGS

By E. B. TOVEE, M.D.

A complete autopsy was performed nine hours after death.

The body was that of an obese 71-year-old female weighing 224 lbs. The face and neck showed a marked cyanotic hue which ended abruptly at the level of the shoulders.

Interest centred on lesions within the *abdomen.* The abdominal cavity contained 400 cc. of clear, sero-sanguinous fluid. The adipose tissue of the abdominal wall measured 7.5 cm. in thickness. Scattered over the entire peritoneal surface were small, raised, whitish-yellow plaques of fat necrosis, the largest measuring 1 cm. and the smallest 1 mm. in diameter. These areas were more marked in the right gutter and in the region of the caecum. From this site they could be traced up to the peri-pancreatic fat and the glandular tissue of the pancreas. The serosal aspect of both large and small intestines was dotted with similar lesions. The *pancreas* weighed 410 grams, part of the weight being made up of adherent fat which could not be dissected away.

It measured 20 cm. in length. In some areas the gland was enlarged, firm and oedematous; in others it was soft, boggy and necrotic. The head showed the least change; scattered throughout it were a few haemorrhages of varying size accompanied by areas of whitish-grey fat necrosis. The body and tail, however, were involved in an acute haemorrhagic process. Two areas of haemorrhage measured approximately 2 x 2 cm. and were soft and necrotic. In the surrounding areas many large masses of whitish-grey fat necrosis were in evidence. The pancreatic duct did not appear to be obstructed or dilated throughout its entire course. The bile duct and the pancreatic duct joined to form a common exit at the ampulla of Vater. The first 0.5 cm. of the pancreatic duct were bile stained, but there was no evidence of gall stones in either the pancreatic or common ducts. The splenic vein contained a small amount of recent thrombus material as it coursed through the centre of the most marked area of fat necrosis.

The *gall bladder* was grossly distended with apparently normal bile. The wall was slightly thickened and the mucosa had a velvety appearance. Within the lumen were myriads of small facetted stones, the largest measuring 0.5 cm. in diameter. The *bile ducts* were normal. No stones were found in the extrahepatic biliary system, but one small stone was present in the right lobe of the liver.

The *liver* was grossly enlarged, weighing 2125 grams. The capsule was thin, smooth, glistening and yellowish-brown, and on its cut surface showed a typical picture of fatty degeneration. In some areas, yellowish, soft, necrotic material could be scraped away with ease. The spleen was small. It weighed 80 grams, and was soft and mushy to palpation.

Microscopic Findings

The *pancreas* was involved in an acute haemorrhagic and necrotic process. In many areas the glandular tissue was entirely destroyed and only faint outlines of alveolar cells could be seen in the background. In these areas, the walls of the arteries were necrotic. Massive haemorrhage had occurred from these vessels. Scattered throughout the entire series of sections were many large areas of purplish-grey fat necrosis, associated with marked infiltration with polymorphonuclear leucocytes. In some sections, the cells lining the ducts appeared to be slightly hyperplastic but did not give rise to any obvious obstruction. There was no definite evidence of metaplasia. The microscopic findings in other tissues had no important bearing on the case.

DISCUSSION

The history and physical findings were suggestive of a late stage Acute Haemorrhagic Pancreatitis. The main points in the diagnosis: the onset of severe epigastric pain in an elderly, obese female immediately following a meal, associated with intractable vomiting; a previous history of a similar but less severe attack with subsequent indigestion; on examination, a moribund patient with generalized peritonitis, intestinal ileus, free fluid in the peritoneal cavity, leucocytosis, and fever. The presence of cyanosis, dyspnoea, fast pulse and lowered blood pressure in this known hypertensive individual were evidence of moderately severe shock.

It is generally agreed that acute haemorrhagic pancreatitis is the result of escape of pancreatic juice into the substance of the organ with subsequent digestion of the parenchyma and the walls of the arteries. In some cases a gall stone has been found at the ampulla of Vater obstructing the common bile and pancreatic ducts and allowing the passage of infected bile from the former into the latter. Such cases are quite exceptional. In others, escape of the pancreatic secretion has been prevented by metaplasia and piling up of the epithelium lining the small ducts, with resulting rupture of the acini and discharge of pancreatic juice into the stroma of the gland. In still others, no adequate explanation of the condition can be found. It is in this last category that the present case must be placed.

THE SURGERY OF CORONARY DISEASE

By G. W. MANNING, M.A., '40 AND C. G. McEACHERN, M.D., B.Sc. (MED.)

The first successful surgical attack on a case of angina pectoris was reported by Jonesco in 1916, who removed the cervical sympathetic nerves and stellate ganglia. This was based on the speculations of Francois Frank (1899). Although this brilliant success stimulated universal interest, in the hands of other surgeons the result was disappointing. During the past twenty years experimental and clinical investigation carried out by an increasing number of workers has led to the present day treatment of coronary artery disease. However, such treatment is mostly palliative and the actual reduction in mortality due to coronary artery disease is not striking. Consequently, with the present understanding of the anatomy and physiology of the heart, Beck and O'Shaunesey, principally, and more recently Raney, Fauteaux and others have again investigated the possibilities of surgery in the treatment of coronary artery disease.

The present status of the surgical treatment of coronary artery disease and cardiac pain involves a consideration of three main methods of attack:

1. Operations on the thyroid gland.
2. The development of a collateral blood supply to the heart.
3. Operations on the sympathetic nervous system.

Thyroid Gland

Christian was one of the first to appreciate the close relationship between thyroid activity and cardiac disease and in 1925 expressed the concept that "thyroid deficiency may be a form of cardiac rest that is advantageous to the heart". Reisman and Boas and Shapiro and others performed subtotal thyroidectomy in some patients having cardiac disease but not considered as having thyroid disease. However, their results were disappointing and it was not until 1933 that Blumgart, Levine and Berlin made their original proposal of total thyroidectomy in the treatment of chronic non-thyrogenous heart disease.

The rationale of total thyroidectomy is based upon a decrease in tissue metabolism consequent to the removal of thyroid secretions and an interruption of cardio-sensory impulses which is coincident to the operative removal of the thyroid gland and depends upon the anatomic relationship of the cervical cardiac nerves to the gland. Although Blumgart and his associates have shown that thyroidectomy resulted in a decreased speed of blood flow, tissue metabolism is also correspondingly diminished. Thus it seemed reasonable to assume that by thyroidectomy it would be possible to relieve a patient in whom a diseased heart was incapable of delivering an adequate flow of blood by correspondingly diminishing the metabolic demands. The exact mechanism of the relief of pain immediately after operation following total thyroidectomy still remains unsatisfactorily explained. One group of investigators, principally Weinstein and Hoff, support the view that this immediate relief of pain is due to injury of the superior and middle cardiac nerve plexuses on the posterior surface of the thyroid gland and its vessels. However, Langley and others strongly deny the presence of cardio-sensory afferent fibres in the superior cardiac nerves, whereas Levine and his associates are of the opinion that the relief of pain following total thyroidectomy is due to a lessened sensitivity to epinephrine. On the other hand, Blumgart and others, from their studies, were led to believe that there was no altered or diminished sensitivity to epinephrine following total thyroidectomy. Thus the mechanism of the relief of pain is still controversial. However, the bulk of evidence appears to be in favour of interference with cardio-sensory pathways.

The procedure has been inadvisedly performed in many instances, but with increasing experience the criteria for the selection of patients have become more rigid. Blumgart advises against operations in the presence of rapidly progressive cardiovascular disease, such as malignant hypertension or syphilitic cardiovascular disease. Hepburn, Levine and others have shown that it is unwise to operate on patients who are in the terminal stages of the disease. A low preoperative basal metabolic rate is another contraindication to operation. The presence of a recent coronary occlusion, renal insufficiency and active infection are further contraindications to operation. Another disadvantage of the procedure is the production of myxedema. This, however, may be justified if it relieves the patient of agonizing and intractable pain. Small doses of desiccated thyroid (grains ¼ per day) may be given to prevent myxedema.

Collateral Blood Supply

The rationale of the procedures advocated by Beck and O'Shaunesey is based upon an attempt to increase the coronary vascular bed which is invariably diminished in coronary sclerosis. The compensatory circulatory mechanisms of the heart are inadequate, as is evidenced by the high mortality due to coronary disease. Thus if blood could be brought to the myocardium supplementing the deficient supply of a diseased coronary bed, then adequate cardiac function would be restored.

Beck and his co-workers first produced a collateral vascular bed by roughening the parietal pericardium and epicardium. Pericardial fat, pedicle grafts of pectoral muscle and omentum were used for the new vascular bed and within three weeks, anastomosis between the grafts and the heart could be demonstrated. In another group of experiments he found that sudden occlusion of a coronary artery resulted in 70% mortality in normal dogs, whereas in animals with increased collateral anastomosis, similar sudden coronary occlusion was attended by only 33 1/3% mortality. Further animals prepared in this manner would continue to survive when all superficial coronary arteries were gradually ligated.

These investigators believe that a collateral vascular bed results in a uniform distribution of blood to the myocardium by transporting blood from extra cardiac sources into the myocardium and from one part of the heart where the circulation is good to another part of the heart where the circulation is deficient.

The operation consists of grafting part of the pectoral muscle upon the myocardium. A transverse skin incision is made and the pectoral muscles are separated from the chest wall by blunt dissections. The pectoral muscle is divided about 4 inches from the sternum to make a graft with the pedicle attached along the sternal margin. The 5th and 6th costal cartilages are removed (avoiding the mammary vessels) and the parietal pericardium is opened. The lining of the parietal pericardium and epicardium is roughened and in several human cases Beck has placed powdered beef bone in the pericardial cavity for the purpose of producing a low grade foreign body reaction. The graft is divided into two parts parallel to its fibres along the lower margin of the third rib. The upper portion of the graft is placed beneath the sternum to the right ventricle and the lower is applied to the left ventricle. The pericardial cavity is left widely open so that adjacent vascularized tissues are in contact with the anterior aspect of the heart.

The operation was performed for the first time on a patient in February, 1935. The patient, who had been forced to give up his work due to severe substernal pain, made an excellent recovery from the operation and returned to work. Beck has since operated on some 25 patients with coronary artery disease. The first 16 of these were attended by a mortality of 50%. However, the earlier cases chosen were extremely poor risks with advanced coronary sclerosis. They were patients who had previously decided that there was nothing to risk because life without improvement was not worth

while. However, to make the operation more practical, this mortality must be reduced. Beck is of the opinion that this can be accomplished by selecting patients who do not have too far advanced coronary sclerosis and by reducing the magnitude of the operations. In the last 5 patients of this group of 16 in whom this was done, there were no operative deaths. Beck considers the results of this work up to the present sufficiently good to encourage further development of the subject. However, with regard to the operation on patients, he has adopted a conservative attitude and feels that careful observation of the surgically treated cases rather than building up a large series, is of greater importance in ascertaining whether or not the operation is of a definite and permanent value.

In experimental work not published yet, Fauteaux of Montreal is reported to have shown that in dogs, ligation of the anterior descending coronary artery is attended by 100% mortality, whereas if a small portion of the artery is resected and the accompanying veins ligated, the mortality is reduced to zero. Although such a perfect experimental result arouses doubt, one must conclude that the operation does definitely reduce the mortality from coronary artery ligation in the dog.

Fauteaux concludes that by ligating the veins, a back pressure is produced, consequently, it increases the pressure and amount of blood in the area drained by these veins, which is the area supplied by the occluded artery. Thus blood is supplied to the occluded area from the thebesian veins and also from non-occluded branches of coronary arteries which are drained by the ligated veins. An objection to this reasoning is the high zone of resistance at the capillary bed (Anrep, Lane Medical Lectures). It has been shown that blood flows readily from arteries to veins across the capillary bed. Also blood flows readily from veins to thebesians and vice versa. There appears to be a free communication between the thebesian channels and the venous side of the capillaries and that to reach the arterial side of the capillary bed, blood must traverse this high zone of resistance. This has never been shown to occur and the thebesian system is considered to be an auxiliary drainage system.

Resection of a proximal portion of the artery may result in denervation of the arterial bed. This may be of benefit in relieving spasm if it is present, or by such denervation the normal tone is relieved and passive dilation could be much more effective. Also, if one considers the possibility of reflex ventricular fibrillation following coronary occlusion, then resection of the artery may interrupt this mechanism, thus reducing the incidence of fatal ventricular fibrillation.

The operation has been performed on one human patient. However, sufficient time has not elapsed to judge the value of the procedure. At the time of writing this article, Fauteaux's work was not published but will appear in the January number of *Sur. Gyn. and Obstetrics, 1940.*

Operations on the Nerve Supply to the Heart

The rationale of the surgical procedures which attack the nervous system is based upon an interruption of cardio-sensory and motor pathways. Diagrammatic representation of the cardio-sensory and motor pathways are illustrated in the two accompanying diagrams.

Although there is considerable controversy as regards the nervous control of the coronary circulation, at the present time the preponderance of experimental evidence indicates that vasoconstrictor fibres are carried in the vagus and dilators in the sympathetic nerves. It is now thought that there is also a tonic control of the coronary vessels although the nature of this mechanism is still not very well understood. Anrep, Hochrein and Rein are of the opinion that this tonic constrictor action is maintained by the vagus. On the other hand, it has been shown by Greene and Hinrichsen that the predominant dilator action is a function of sympathetic fibres passing through the stellate ganglion. Danielopolu has

emphasized the importance of this question because if sympathetic fibres passing through the stellate increase coronary blood flow, then excision of the stellate ganglia for relief of angina is not only unjustifiable but may even jeopardize the patient's life.

Jonesco in 1916 first applied the procedure of sympathectomy in a case of angina pectoris. He removed the entire cervical sympathetic, including the stellate ganglion, bilaterally. A number of operations based on divergent rationales have been advocated since that time, with varying degrees of success. However, in general the attack has been upon the cervical sympathetic chain including the stellate ganglion. Leriche and Fontaine's results are probably among the most representative. Of 163 cases 52.5% obtained good results, 20.2% showed some improvement, 12.9% had no improvement and 14.7% died. In the light of recent experimental investigations it is obvious that unless the accessory pathways through the cardiac nerves are interrupted, cervical sympathectomy alone will fail to be of value in a large number of cases.

It has been shown experimentally (McEachern, Manning and Hall) that sudden occlusion of the left circumflex coronary artery in the conscious dog is attended by a 75% mortality. When the stellate and upper five thoracic sympathetic ganglia are removed bilaterally at previous operations, sudden occlusion of the artery results in a mortality of only 10%. The typical pain that accompanies coronary occlusion in the dog is also abolished by this procedure. The ideal procedure then should include resection of the upper five thoracic sympathetic ganglia. In this way, all sensory fibres from the heart would be interrupted. However, such a procedure in patients who are already

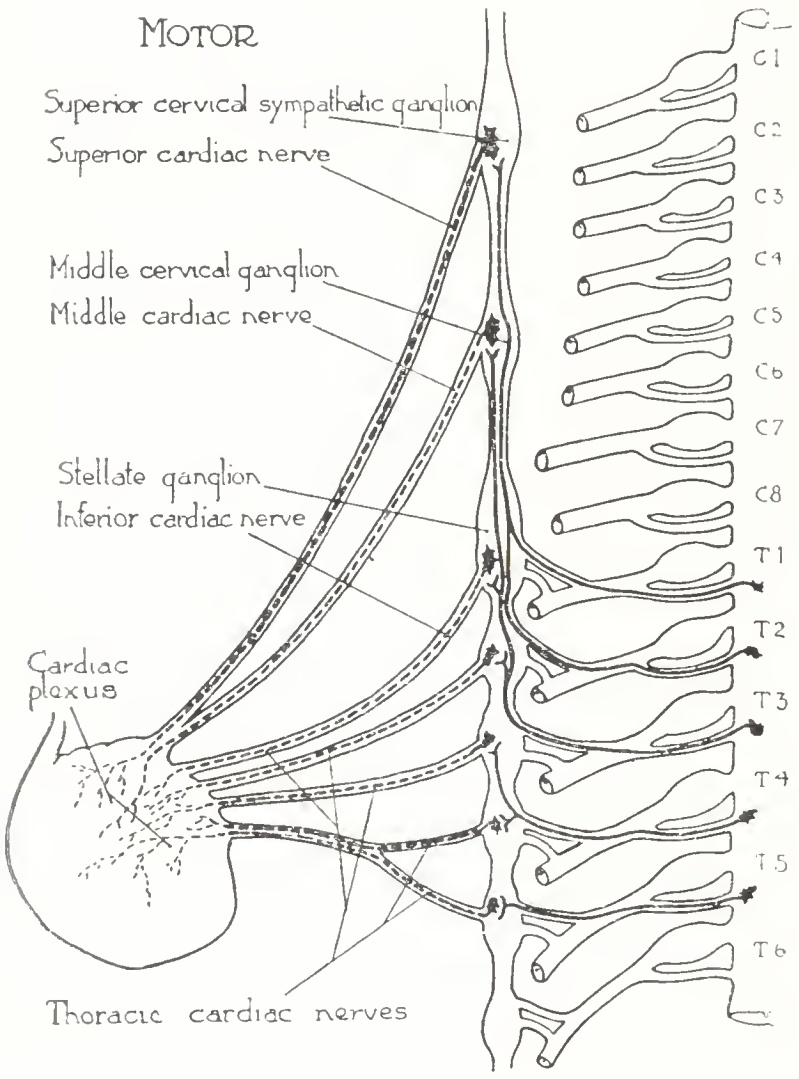

FIGURE I

Diagrammatic representation of the sympathetic motor innervation of the heart.

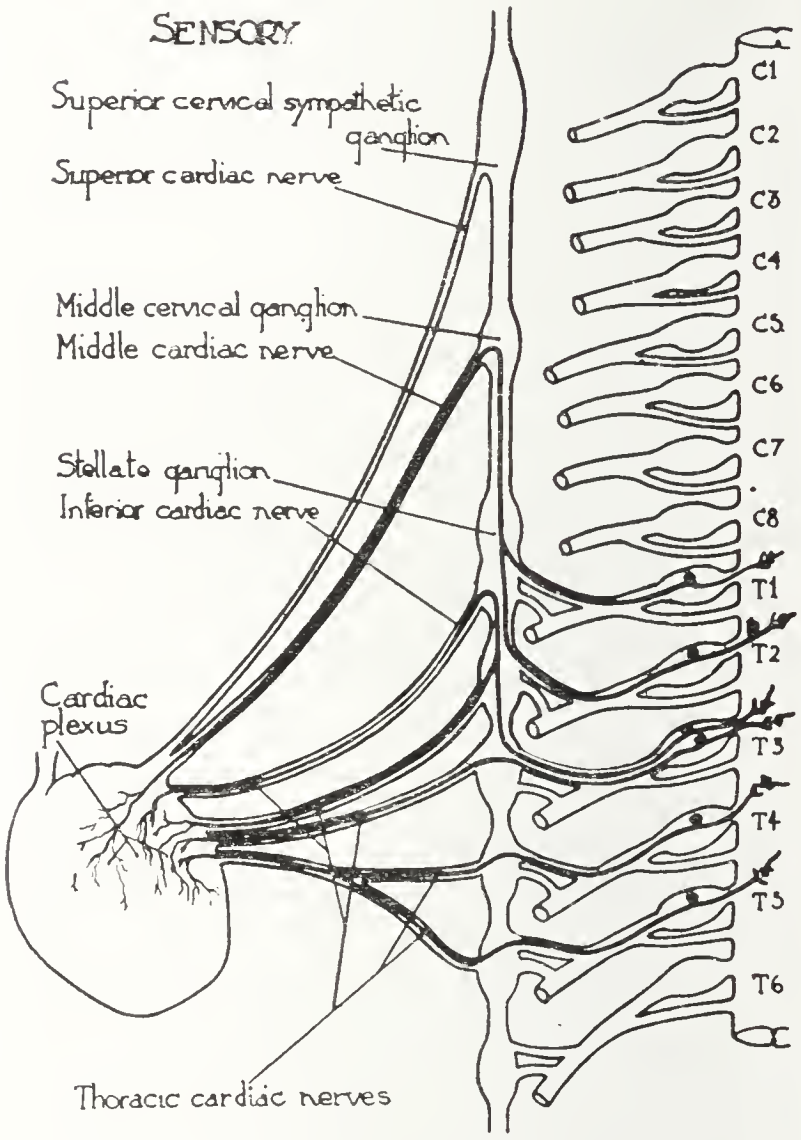

FIGURE II

Diagrammatic representation of the cardiosensory pathways.

poor risks would undoubtedly carry an unjustifiable high mortality.

One solution of this difficulty has been the paravertebral alcohol injection method. Svetlow was the first on this continent to advocate injection of the thoracic sympathetic ganglia for the relief of cardiac pain. In a series of 68 cases reported by White and Marvin, successful results were obtained in 80.9%, failure in 17.6% and fatalities in 1.5%. In comparing these results with those of cervical sympathectomy it is apparent that there is a higher percentage of successful results and the mortality is lower. Another advantage is the simplicity of performance, which greatly minimizes the danger in patients who are such poor risks.

The technique of paravertebral alcohol injection is relatively simple. Ochsner and DeBakey prefer to have the patient lying face downward with the chest supported by pillows. The spinous processes of the seventh cervical and first to the fifth thoracic vertebrae are located. The tip of each spinous process lies at the level of the transverse process and posterior angle of the rib next below. The points of injection are 3½ to 4 cm. lateral to the spinous processes. A small novocaine wheal is produced at these points and needles 8 to 10 cm. in length are inserted perpendicular to the surface of the back to a depth of 3 to 3½ cm. touching the upper four transverse processes. The needles are then inclined in a slightly caudal direction so as to slip beneath the transverse processes or angles of the ribs and directed medially about 20° toward the mid-line and inserted for about 3 cm. At this depth bone is usually touched, indicating that the needle is in contact with the lateral aspect of the body of the vertebra. At this stage aspiration should always be done, if blood or spinal fluid is aspirated then the position of the needle must be changed. With the needles in the correct position, 2 c.c. of 2% novocaine adrenaline solution should be injected through each. In fifteen minutes anaesthesia should appear in the axilla, a short distance down the inner surface of the arm, and over the third and fourth ribs. Horner's syndrome and anhydrosis of the entire arm and side of the neck and head should be present. If these signs fail to develop, a readjustment of the needles should be made. In order to insure widespread anaesthesia, it is preferable to inject 3 c.c. more of novocaine through each needle. This makes the final injection of alcohol painless. Three to four c.c. of 95% alcohol are then slowly injected into each needle.

Recently (October, 1939) Raney has reported a surgical procedure for the treatment of angina pectoris which appears to be the most beneficial, yet least disturbing method up to the present time. The operation is based on the assumption that in angina pectoris, sympathetic action on the coronary vessels is reversed, because of pathologic changes occurring about the myoneural junction; i.e. sympathetic impulses in such cases produce coronary constriction. As Raney has pointed out, operations previously recommended have given relief at the expense of postganglionic fibres or afferent fibres or both. The operation is done through a paravertebral incision from the second to the sixth rib. A portion of each of the third, fourth and fifth ribs is resected; the intercostal muscles are removed; thus the neurovascular bundles are exposed. The sympathetic chain from the second to the fifth dorsal ganglion and their corresponding rami communications are then exposed extrapleurally. The operation is completed by section of the rami communicantes from the intercostal nerves and section of the sympathetic chain between the fifth and sixth dorsal ganglia. The operation is preganglionic; the major portion of the afferent mechanism is left intact. Horner's syndrome is not produced, and the efferent pathways on the operative side are almost entirely interrupted. A complete interruption of the efferent pathways to the coronary system theoretically would involve a bilateral operation; however, operation on the left side only is all that has been required to give relief from attacks in eleven patients. In these eleven patients there have been no deaths and all have obtained complete relief.

The main methods of attack in the surgical treatment of coronary artery disease have been discussed. A proper evaluation may be difficult since the advocates of each method will obviously paint a favourable picture of the advantages of their method. However, each method probably has its place in the treatment of coronary disease and critical analysis should aid in selecting which type of patient is best suited for each method.

From recent experimental investigation, it appears that a reflex mechanism initiated by occlusion of a coronary artery results, in many instances, in fatal ventricular fibrillation. Whether this be due to generalized spasm of the coronary bed, or to a reversal of sympathetic activity, as suggested by Raney, or to an increase in ventricular irritability is not definitely known. However, the surgical procedure which will remove this effect would appear to be the most valuable operation in the surgical treatment of the various forms of coronary artery disease.

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ANOTHER LITTLE DRINK DIDN'T DO ANY HARM

I had twelve bottles of whiskey in my cellar and my wife told me to empty the contents of each and every bottle down the sink "or else." So I said I would, and proceeded with the unpleasant task.

I withdrew the cork from the first bottle and poured the contents down the sink, with the exception of one glass, which I drank. I extracted the cork from the second bottle and did likewise, with the exception of one glass which I drank. I then withdrew the cork from the third bottle and emptied the good old booze down the sink, except a glass which I drank. I pulled the cork from the fourth sink and poured the bottle down the glass, which I drank.

I pulled the bottle from the cork of the next and drank one sink out of it and poured the rest down the glass. I pulled the sink out of the next glass and poured the cork down the bottle. I pulled the next cork out of my throat and poured the sink down the bottle and drank the glass. Then I corked the sink with the glass, bottled the drink and drank the pour.

When I had everything emptied, I steadied the house with one hand and counted the bottles and corks and glasses with the other, which were twenty-nine. To be sure, I counted them again when they came by, and I had seventy-four, and as the houses came by I counted them again, and finally I had all the houses, and bottles, and corks, and glasses counted except one house and one bottle, which I drank. I have the wifiest little nice in the world.

SECONDARY SHOCK AND ITS RELATION TO WOUNDS

By G. A. LANE, '40, AND J. G. WATT, '41

Secondary shock is a problem with which doctors will contend, so long as men are subject to extensive injuries and burns. It is endemic throughout the world in times of peace but it occurs with great frequency during wars. The greatest epidemic was from 1914 until 1918, and now the senseless territorial ambitions of an ill-advised Austrian paranoid are thrusting upon the world another great epidemic.

The Nature of Secondary Shock

The early conceptions of secondary shock are interesting. Ambroise Paré, the great French surgeon, described it as Syncope and Heart Failure. We now know that shock is not due to heart failure. William Clowes in 1568 thought it was due to some foreign matter in the blood, and in view of Cannon's recent theory of a circulating toxin Clowes was not far wrong. John Hunter recognized the dangers of diminished blood volume and advised against amputation of a traumatized limb for fear of further blood loss, yet he could not get away from the prevailing idea, 150 years ago, that bloodletting was a cure for all ills. Sir Astley Cooper describes an interesting case. He states: "I saw a man who fell into a vat of hot beer, by which both lower extremities were scalded, but the body escaped any direct injury. This man's pulse was small and feeble; his skin was cold; his teeth chattered; reaction took place and he died in eight hours notwithstanding stimulants were freely given." This is an accurate description of the typical picture in traumatic shock.

Crile was first to show that the heart retains its efficiency as a pumping mechanism. The introduction of saline solution into the circulation of an animal in shock caused the heart to become slower, and the blood pressure to return to normal.

During the Great War it was observed that shock frequently occurred 4-12 hours after injuries that did not involve vital structures or cause serious haemorrhage. In many cases when a tourniquet, after being in place several hours, was removed from a damaged limb, shock developed immediately. This led Cannon, Fraser and others to look for a circulating toxin.

Cannon and Bayliss produced shock in cats by traumatizing one hind limb. Within 20 minutes of injury the blood pressure fell, there was an increased pulse and respiratory rate, a fall in CO_2 combining power of the plasma and a concentration of erythrocytes with a reduction of total blood volume. This did not occur if all the vessels of the traumatized limb had been tied off, but shock occurred promptly after release of the ligatures. Injections of muscle extracts, histamine and peptone caused shock-like circulatory failure, and Lewis compares shock to the triple response. The wheal is a local response to mild tissue injury, whereas shock is a generalized massive reaction to extensive injury, and the condition threatens or terminates the life of the organism as a whole. Ebbecke made the pertinent observation that anything that will produce a wheal when applied locally will cause shock if given, intravenously, in sufficient quantity. Furthermore no one has as yet proven that there is a circulating toxin in the blood.

Abel and Rowntree have shown that much more plasma than whole blood can be withdrawn from the circulation before signs of circulatory failure occur. This fact contradicts the suggestion that concentration of the blood and increased viscosity are the major factors in the production of shock.

The most recent experiments have just tended to support the theories advanced by Cannon and Blalock. Our present conception of shock is that it is caused by multiple factors, and the methods of treatment are as varied as the theories of the mechanism of shock. Further research is

necessary, yet much has already been accomplished.

Shock is a circulatory deficiency, neither cardiac nor vasomotor in origin, characterized by decreased blood volume, decreased cardiac output and by increased concentration of the blood.

Symptoms of Shock

The patient lies in bed completely prostrated and making no effort to move or look about him, he remains staring with an expression of complete indifference as to his condition. There is no movement of the muscles of his face; the eyes, which are sunk deep in their sockets have a weird uncanny look; the features are pinched; the face shrunken; a cold clammy sweat exudes from the pores of the skin; there is an appearance of profound anemia; the face may be ashen or livid, while the lips are bloodless and the finger tips blue. The mouth is parched, and intense thirst is complained of, but attempts to relieve this are ineffective because of vomiting. The temperature per rectum may be 96° or 97° and it falls even lower. Respiratory movements are reduced to the minimum and with the passage of time they become rapid, shallow, and eventually quite irregular. The pulse is imperceptible or perchance may be felt as a weak thread-like stream, at times uncountably fast. Muscles are not paralyzed anywhere but the patient has a great disinclination to stir. There is no insensibility but there is a strange apathy and the full meaning of questions put to the patient seems to be realized but imperfectly. Consciousness is retained for some time till finally there supervenes loss of sensitivity, loss of response to stimuli and loss of reflexes. The limbs become toneless, spontaneous movements are lacking, the pupils are dilated, sphincter incontinence occurs, and finally the patient passes into a state of coma—the prelude to death.

Pathology of Shock

From the first the problem of shock was regarded as essentially a physiological disturbance unaccompanied by any characteristic morbid anatomical features. On the contrary, however, the tissue changes at autopsy might almost be described as outstanding. Post-mortems disclose the following features. The veins in the subcutaneous and peripheral areas are collapsed and bloodless, in strong contrast to those in the viscera which are found to be deeply congested and to have a purplish, diffuse, cyanotic colour specially prominent in the lungs, liver, and gastro-intestinal tract. The venules of the visceral peritoneum are engorged, torfuous, and distended. The serous surfaces of the pleural, pericardial, and peritoneal cavities are diffusely congested and appear cyanotic. Ecchymoses are frequent and blood tinged fluid is often found in those situations. The viscera are intensely congested and edematous. Edema and massive effusion are more marked when shock has developed gradually and death is not immediate. When shock ending in death develops rapidly, congestion and capillary haemorrhages are marked, while edema is less prominent.

Microscopic examination discloses acute edema and minute extravasations of blood associated with marked congestion of the capillaries and venules in the visceral organs. Extravasation is particularly marked in the lungs and gastro-intestinal mucosa. If death was delayed, parenchymatous degeneration can be demonstrated in myocardium, liver and kidneys.

The inference to be drawn from these findings is that there has been a widespread loss of capillary tonus which has rendered these vessels abnormally pervious to the blood plasma.

Cause of Death in Shock

Capillary dilatation is produced and once this occurs the body is swept rapidly into the intricacies of a vicious circle that all too often only ceases when the last breath of the individual has been drawn. First there is produced a generalized vasoconstriction in an attempt to compensate for the increased volume of the capillary bed. Blood pressure may be maintained for a time by this mechanism,

but this is done at the expense of the volume flow. Between the dilatation and the decreased circulation, stagnation and stasis develops in extensive capillary areas. If, as often happens, the same agent which relaxes the capillary walls also renders them abnormally permeable to the blood plasma, fluid leaks into the tissue spaces and further aggravates the stasis. With impaired venous return to the heart the cardiac output is reduced, less oxygen is carried to the tissues, and anoxia occurs—but anoxia is a sufficient cause in itself to impair the function of the capillary endothelium and thus the vicious circle is completed. Unless this can be checked the cardiac output becomes reduced beyond the point where it can maintain the arterial pressure; this collapses and the cycle has almost reached the terminal stage.

This then is the mechanism of shock which has been a puzzle for so long. The cause of death and the clinical findings are the logical sequence of a developing tissue anoxia. When this begins to depress the vital centres, the shadow of death has fallen across the individual, and this shadow leaves its calling card plainly marked in the pathological picture that has been described as a post-mortem feature.

The Relation to Wounds

Much of this relationship is by now self-evident and little need be added. As a result of the liberation of some, as yet hypothetical, toxin, there is an interference with normal capillary function. Dilatation, congestion, and transudation of fluid occur. It has been pointed out that such a disturbance is more than adequate to account for the clinical symptoms and the pathological picture. The only point on which there is any shadow of doubt is the mechanism by which the capillary damage is initiated, and the only reason there is any doubt on this point is because no one has ever succeeded in isolating the substance responsible from the blood stream. After all the shock following burns is generally admitted to be toxemic in nature, yet these toxins have never been isolated from the blood stream. Why could the same not be true of wounds?

Prophylaxis of Shock

An account such as the foregoing must leave one with the impression that shock is a condition to avoid as completely as possible. The most logical method of doing this is obviously to avoid the cause. Unfortunately this is not easy, particularly when, as at present, it is possible for one man to produce a state of shock in millions. Prophylaxis then boils itself down into the elimination of the various factors which predispose or accentuate shock. These factors are many and varied. Of them all, haemorrhage is undoubtedly the most important, but, because any great degree of haemorrhage is so obvious, it is usually given priority in treatment anyway—unless of course it is concealed, when it may be readily missed. The danger of shock is not gone as soon as blood loss is checked however, and prompt action must be taken to restore the blood volume if this has been reduced to any great extent.

Other abnormal manners in which fluid may be lost must not be overlooked. Sweating is perhaps the most common of these, but vomiting must not be forgotten. Particularly under war conditions where water may have been rationed, it must be remembered that dehydration may be present even before the factor that precipitates the shock.

Rough handling and the production of unnecessary pain are important factors which are relatively easy to eliminate. Pain already present is greatly eased by morphine and this drug has the further advantage of relieving the worry and strain that may be fully as potent aggravating factors as actual physical discomfort.

Infection, fatigue, exhaustion, and exposure are very important in the production of shock, but as these conditions are usually present before the initiating trauma, or at least by the time the patient is brought to the doctor, little can be done to avoid them. Their im-

portance in prophylaxis needs to be stressed to the first aid workers, not the hospital attendants.

Loss of body heat is of tremendous importance and its conservation should be attempted by all possible means. This is most effectively done by wrapping the patient in several layers of blankets and supplying large amounts of hot fluids.

The experiences of the last war have abundantly illustrated the prominent part played by the absorption from traumatized areas. It seems to be the unanimous opinion of military surgeons that the conservative treatment of all types of gunshot wounds was followed by a high mortality from shock, while more radical debridement of wounds resulted in a decrease both in incidence and severity. Marked improvement often followed rapidly on the amputation of badly mangled limbs. Everything favouring absorption from an injured area favours the development of shock. It is this that makes a wound with a small opening but extensive subcutaneous damage more likely to cause shock than a large gaping wound that is open to the air. For this reason too, experience showed that tourniquets are best avoided wherever possible, and haemorrhage checked by direct pressure if this is at all feasible. If a tourniquet is necessary, it should be applied as far peripherally as possible and for as short a time as possible, unless amputation is indicated in which case the tourniquet should never be removed.

There is one more point to stress in this section. Delay in treatment is more conducive to shock than any other single factor. Prophylactic treatment to be effective must be carried out at once. This statement also applies to the treatment of shock once it is actually present. For this reason then it becomes of extreme importance to recognize the earliest signs of the condition. In the past the main difficulty in treatment has been that the clinician has waited till there was a fall of blood pressure to diagnose shock. Low blood pressure it must be emphasized is not a sign of shock but a sign that shock has been present for some time, perhaps too long a time. A comparison may be drawn to the householder who carefully places a brand new padlock on his garage door the morning after someone has removed his automobile.

The onset of shock is marked by the occurrence of hemoconcentration, and therapy must be commenced at this stage of the cycle in order to anticipate that complicated interplay of the varied group of agencies whose combined effect culminate in circulatory failure. Hemoconcentration is a feature that is regularly present, appears early, progresses in a degree parallel to that of the circulatory deficiency, and is detected by relatively simple means. Recognition may be made by the hematocrit, by measuring the specific gravity, by estimating the hemoglobin present, or by a count of the red blood cells. The last method is the simplest and the most accurate. A hemoconcentration of 20% means a decreased circulation in the peripheral areas. Empty flaccid superficial veins with a pale skin that does not bleed readily and a hemoconcentration of 25% are ominous signs.

Therapy of Shock

Having correlated the clinical, experimental, and pathological facts as well as possible, we may now proceed to investigate the various methods of therapy in common use, and applying the knowledge gained, evaluate the relative merits of each. The substances used for this purpose are as many and varied as the theories that have been propounded as the cause of this condition. From what has been said it is seen that some method of treatment is needed which will restore the volume flow of the blood before the higher centres have been irreparably damaged. There are three methods of restoring blood volume; mechanical, with drugs, and with fluids.

A. Mechanical

These methods were devised because of the recognition of the low venous pressure. The means included elevation of the lower extremities, mechanical pressure, strapping and other devices. In view of the fact that the blood is pooled not in

the veins but in the capillaries, it is not surprising that the results obtained were uniformly unsuccessful. Blood sequestered by stasis in the visceral capillaries is not readily affected either by gravity or external pressure; besides which these methods may further embarrass the failing circulation.

B. Drugs

If a drug is used, it must be non-toxic, it must have a pronounced hemodynamic action, it must have a marked stimulant action on the central nervous system, and this action should be lasting so that the various body systems may regain the physiologic state lost by the previous inadequate circulation of the blood. Many of the substances that have been used in treatment fail to pass the acid test of these requirements.

Since shock was for long attributed to a failing heart, the use of *digitalis* was and sometimes is quite popular. This use is based on a misconception and is entirely illogical. Far from being non-toxic, indications are that in therapeutic doses this drug is very likely to cause harm.

Coramine is a stimulant and is non-toxic, but is primarily a cardiac stimulant, and as such it is entirely worthless.

Strychnine is the best stimulant that we have and its use is strongly advocated by some. However, it has no significant effect on blood pressure and there is no constant increase in the minute output. Beneficial results are very variable and in any case do not seem to be permanent.

Caffeine increases oxygen consumption and so will aggravate the anoxemia. There is no constant increase in the minute output and in severe cases the drug is actually harmful.

Epinephrin is as illogical as digitalis but at least it is not as toxic. There is a temporary rise in blood pressure and increase in minute volume, but nothing else. Overdosage with this drug has been used experimentally to produce shock.

Because of its action on normal capillaries the use of *pitressin* has been advocated by some. Experimentally there has been no response to this drug on the part of the damaged capillaries and clinical evidence of its usefulness is scarce.

The use of *cortical extracts* followed on the discovery of the state of the capillaries in cases of Addison's disease. Favourable reports have come from a few individual enthusiasts, but any proof of the efficacy of cortin is entirely lacking. Indeed it is not easy to conceive of a deficiency in circulating cortin arising sufficiently acutely to be responsible for a state of shock.

The only drug of positive value is *morphine*, and it does not act by increasing the volume flow. This drug decreases painful sensory stimuli and so maintains the tone of the vital centres. To give it, as is sometimes done, until the respirations have been affected is a grave mistake as large doses are depressive and more than undo the good that small doses have accomplished.

C. Fluids

Attempts to restore blood volume by means of fluids are logical procedures. The benefit derived is in direct proportion to the time at which administration is commenced. Once the vital centres have been deprived of adequate oxygen for any length of time, all methods of therapy are doomed to failure.

The first fluid tried for this purpose was simple salt solution. Normal saline is perhaps of more value in prophylaxis than in therapy, but it is of definite benefit in mild cases. This is not a property of the saline, however, since this is true of any type of intravenous fluid. When the permeability of the capillaries is unimpaired, circulatory efficiency can be restored by saline. All cases of shock whose blood volume is moderately reduced but whose vascular system can still retain fluids are aided by saline. In more severe cases saline affords little benefit; indeed the possibility of injudicious administration of too much fluid must be kept in mind.

Glucose solution has no advantage over normal saline, as the blood sugar is not lowered in shock. It is useful in the same type of cases in which saline is of benefit.

The use of *gum solutions* is a very controversial subject. Acacia was apparently used with benefit during the last war once a pure supply of the material was obtained. It is certainly useful in cases of straight haemorrhage where blood is not available. In mild cases of shock where capillary permeability is unimpaired, acacia seems to be less useful than saline. In these cases it seems to be an advantage to have a fluid that can leave the blood vessels easily and be mobilized where needed. In more advanced cases it produces a temporary improvement but is definitely inferior to whole blood for this purpose. In extreme cases it is valueless. In addition, there has not yet been produced adequate proof that the substance is entirely innocuous. It has been recovered from the blood stream some time after administration and has been demonstrated in the tissues at autopsy.

The ideal fluid for intravenous administration is of course whole blood. However, there are the same qualifications as previously. After the lapse of a certain amount of time no fluid will be successful in restoring the circulation.

One other note must be made on treatment. The decreased carbon dioxide content of the blood prompted the trial of inhalation of this gas. Experimentally this was found to stimulate the heart's action and the general circulation but this effect was lost promptly on cessation of the treatment. When inhalation was prolonged, the beneficial effects merged into toxic ones and the ultimate result was worse than if nothing had been done. Intravenous sodium bicarbonate was tried and found to produce a better response than either method alone. Convalescence was much smoother and in post-operative cases there was less nausea and vomiting. The use of oxygen is certainly a logical step if, as we have proposed, the cause of death in shock is anoxia. We can only await a more extensive trial of this method before we can assess its value.

Pages from the Past

"SIC TRANSIT . . . . . .

"In vain we compute our felicities by the advantage of our good names, since bad have equal durations, and Thersites is like to live as long Agamemnon. Who knows whether the best of men be known, or whether there be not more remarkable persons forgot, than any that stand remembered in the known account of time? Without the favour of the everlasting register, the first man had been as unknown as the last, and Methuselah's long life had been his only chronicle.

Oblivion is not to be hired. The greater part must be content to be as though they had not been, to be found in the register of God, not in the record of man. Twenty-seven names make up the first story before the flood, and the recorded names ever since contain not one living century. The number of the dead long exceedeth all that shall live. The night of time far surpasseth the day, and who knows when was the equinox? Every hour adds unto that current arithmetic, which scarce stands one moment. And since death must be the Lucina of life, and even Pagans could doubt, whether thus to live were to die; since our longest sun sets at right descensions, and makes but winter arches, and therefore it cannot be long before we lie down in darkness, and have our light in ashes; since the brother of death daily haunts us with dying mementos, and time that grows old in itself, bids us hope no long duration;—diuturnity is a dream and folly of expectation."

Hydriotophia or Urn Burial, 1658,

Sir Thomas Browne.

INFECTIONS OF THE HAND IN FISH HANDLERS*

By G. M. WILSON, '40

Although the prime purpose of this Journal is the presentation of papers of general interest to the undergraduate body, it was felt that a brief report of a special condition observed and treated by an undergraduate during the past summer might provide interesting reading.

In this paper an attempt will be made to discuss the occupational infection popularly known on the West Coast of British Columbia as Fish Poisoning. The existence of such an infection as a distinct entity peculiar to people engaged in handling salt water salmon has been widely disputed, particularly by those who have not had occasion to treat many cases. The results of a series of 25 cases of infection of the extremities treated by the writer will be presented, the histories of six being given in some detail as being illustrative of the different manifestations of the disease, and from these certain conclusions will be drawn in support of the argument, firstly, that Fish Poisoning should be regarded as a distinct occupational entity, and secondly that early radical treatment in this condition is superior to conservative treatment with delayed drainage.

To understand this infection more fully, one has to consider the factors of environment and population as observed on the Skeena River. With the exception of a few Japanese and Indians, the whole population is transient, consisting of Indians coming from widely separated points on the Coast and Interior, and Japanese, Chinese, and Whites, coming from around Vancouver. It is noteworthy that none of these people suffer from this particular infection except during the summer when they are handling salmon. This condition is not limited to the Skeena River alone, but is found in other fishing centers.

The fishing season lasts from the beginning of June to the middle of September, and can be divided into definite periods dependent on the type of fish running. The incidence of Fish Poisoning is definitely related to the kind of salmon being fished—some apparently carrying the infecting agent, while others do not.

During the first three weeks of June, the fishing is pretty much limited to Spring Salmon, which has the local reputation of being a "clean" fish. In that time, there were no reported cases of this infection. The sockeye salmon, which is the choicest fish for canning, is also a clean fish to handle, and there were only three cases treated from the opening of the season, late in June, till the beginning of the Humpback run, toward the end of July. The Humpback salmon are a much softer variety of fish, and have a peculiar slime on the scales which gives them the reputation of being a "dirty" fish. And this was borne out by the fact of there being five cases of infection coming in for treatment in the first week of the Humpback run. It is thought that this slime carries the organism responsible for the infection, though none were found regularly by microscopic examination of the slime. A thorough study of this condition would necessitate isolation of the organism by culture methods, both from the slime and the infected part. These methods were not available at the time this study was made.

There are three distinct manifestations of this infection when untreated.

1. The most common—*a localized inflammation*, eventually becoming purulent, with fairly extensive local necrosis and great edema of the whole finger and hand.

**Editor's Note:* Dr. J. H. Couch confirms the peculiar clinical entity described by the writer. He encountered the condition in Newfoundland where it is called simply "Fish Finger." The pathological picture coincided with that described by Mr. Wilson; the occurrence in fish workers was well recognized; the prognosis was rather bad, most of them going on to destruction of the finger demanding late amputation. One case only has been encountered in Toronto but it was typical in all respects and resulted in a stiff finger. Dr. Couch suggests that the prognosis may be greatly improved by the logical treatment described in this paper.

2. *A rapidly spreading infection* from the original site, causing lymphangitis and edema of the forearm and hand, and palpable tender axillary glands. In these cases, the white count would rise to between 15 and 20,000, accompanied by a marked general reaction; the temperature becoming hectic and swinging between 99 and 103 degrees. Since the cannery workers are fully aware of the unpleasant sequelae of an untreated case, it is possible that these more general reactions are less common owing to treatment of some sort being instituted early in their course. Yet two cases were seen on the second day after the original sign of the infection, in which the reaction was of the rapidly spreading type.

3. *A localized dermatitis*, closely resembling erysipelas, with a red inflamed heaped-up advancing border, leaving discharging vesicles in its wake. There is a typical manner of spread; the infection starts from the palmar surface, spreads to the dorsal surface of the finger and advances rapidly up the dorsum of the hand. An important point concerning this type is that there does not have to be any initial wound or abrasion of the skin surface, and this would seem to place it in the class of a true dermatitis. This fact is rarely recognized by the Compensation Board, and cases have been thrown out because of the inability of the patient or physician to report any initial lesion. The observations of the writer have led him to believe that there does not have to be any demonstrable lesion in these cases, a conclusion strongly subscribed to by Dr. Cade of Prince Rupert, to whom the writer is indebted for many suggestions as to the treatment and pathogenesis of this condition.

Six typical histories will now be given. These were selected as illustrating the different manifestations of the infection; case 1 showing the usual course of the infection when treated conservatively.

Case 1—E. H. Male Indian, age 42.

Developed salt water cracks in fingers. Infection started in region of first joint of index finger, right hand. Finger became swollen and painful, and he came in for treatment on second day. Received continuous mag. sulph. compresses for 2½ days, with slow localization of the infection. Incision was made over the area of maximum swelling, and a greenish pus was obtained. Wound was packed with plain gauze, and heat continued for two days. A large slough separated, and the wound healed slowly by granulation. No complications. Temp. before drainage—99.8; normal 24 hours after incision. W.B.C. 12,000 before drainage; 7,000 24 hours later. Short Gram pos. chains of cocci in pus. Disability time—9 days.

Case 2—D.W. Female Indian, age 18.

Swollen ring finger of right hand. No history or sign of cut or abrasion on finger. Was seen on third day after swelling was first noticed. There was considerable edema of the hand, but no streaking of the arm and no palpable axillary glands. Hot compresses of 50% saturated copper sulphate solution were started and patient was given Sulphanilamide, gr. xx, q4h. Her admission temp. of 101.8 became normal in 24 hours, when drainage was done. Wound was packed with umbilical cord tape previously saturated with melted sterile copper citrate ointment. Heat by cradle was continued for another 24 hours. Wound healed by rapid granulation in four days. On incision, a thin serous discharge came away, smears of which revealed gram pos. cocci in short chains. W.B.C. before drainage, 11.5; temp. 101.8.24 hours after drainage, W.B.C. 7.0; temp. normal. Total disability, 5 days.

Case 3—C.K. Female Japanese, age 22.

Swollen index finger of left hand—24 hours. Infection was localized to the anterior closed space, but rest of finger was edematous. History of slight puncture wound while cleaning fish in cannery. Hot compresses of 50% saturated solution of copper sulphate were applied for 24 hours, then a deep longitudinal incision was made on the side of the distal phalanx, though no localization was evident. A thin serous bloody discharge came from the incision, and copper citrated packing inserted. 24 hours later the discharge was slightly purulent, but had ceased within 36 hours. Moist heat was applied for this twelve hours. Incision healed rapidly by granulation with no slough formation. W.B.C. before drainage, 10.0; after, 8.5. Temp. normal throughout. Short chains of gram pos. cocci found in discharge from wound. Total disability, 5 days.

Case 4—Mrs. O. S. Japanese, age 48—limited mentality.

Swollen and painful proximal phalanx of right index finger. No history could be obtained of any wound or abrasion. No sign of localization was present and she was sent home to use hot copper sulfate compresses. She did not follow instructions, and returned next day in great pain. Drainage was done in two places, as the infection had spread proximally, and packing inserted as usual. Finger drained well for two days, discharging a slightly purulent material containing short chains of cocci,

then patient resumed work in the cannery against orders. She returned on the fourth day after drainage, with a greatly swollen hand and forearm; temp. of 103.4 and W.B.C. of 18.6. She was advised to enter hospital, but refused, and returned home, where Japanese medicines were applied for two days. She again returned to the office because of the intense pain and marked illness accompanying the infection, and entered hospital. The infection had now spread to the mid palmar space, to the middle finger, and a large collar-button abscess had formed in the web between the fingers. She was given Prontosyl subcutaneously on three successive days, with hot copper sulphate compresses applied continuously to the forearm and hand with some abatement of the general reaction and lowering of admission temperature which was 104.3. Her husband then returned from fishing, and insisted that she be treated at home by Japanese medicines only, and took her into Prince Rupert shortly afterward. When last seen this case had impending gangrene of the index finger and a severe general reaction. Unfortunately, this case could not be followed further. Her W.B.C. reached 26.0, with highest recorded temperature of 104.6. Gram pos. cocci in short chains were repeatedly found in the pus.

Case 5—J.W. Male Indian, age 62.

Severe dermatitis involving the dorsum of the right hand and lower forearm which had spread from the palmar surface of the middle finger. This had an advancing heaped up border similar to erysipelas, leaving in its wake vesicles which discharged a watery pus containing short gram pos. cocci, arranged in chains. This was treated by immersion of the hand and forearm in hot saturated copper sulphate solution, followed by topical applications of 2% Gentian violet. The response was satisfactory, the total disability being three days. The white count was not altered, nor was there any temperature.

Case 6—Male Finn, age 50.

Admitted to hospital with large angry looking skin eruptions on the dorsal surfaces of both wrists, caused by the chafing of the rough edges of his oilskin coat. They looked somewhat like small boils or carbuncles. There was edema of the dorsa of both hands and a lymphangitis up both arms with tender axillary glands on both sides. Admission temp. 102.2°.

He was treated by hot arm baths, alternated with electric cradle, until localization had taken place. Then these lesions were incised, and continued to drain for about three days, during which time antiphlogistine poultices were applied with benefit. Smear showed the presence of short chained Gram pos. cocci. The wounds took a long time healing, ammoniated mercury being used with some benefit. Total incapacitation, 25 days.

Etiology

The etiological agent in this condition would seem to be a hemolytic streptococcus of relatively low virulence. This observation is based on the morphological characteristics of the organism, the clinical course of the infection, and its prompt and satisfactory reaction to prontolyn. Verification of this should entail careful bacteriological investigation by culture and isolation, a procedure not available for this study because of limited facilities.

Incidence

So far as is known, this infection occurs in its typical form as described, only amongst those people engaged in handling salmon; fishermen and cannery workers. It is no respector of colour or station, with all races and ages being equally affected. It occurs most frequently in those who handle the uncleaned fish—e.g. fishermen, cleaners, and lastly fillers, in that order. The fishermen are continually exposed to the infection because they are constantly handling nets that become covered with fish slime. This slime has to be removed from the nets once a week by soaking in 50% bluestone solution to prevent rotting of the web. The cleaners wear cotton gloves when washing fish, but this seems to have no effect in preventing the slime from getting on their hands. They are also exposed to the danger of getting a fishbone in their fingers, as in the process of cleaning the fish with a wire brush, the bones are loosened and often make a slight puncture wound in the skin. This is a sure recipe for infection.

However, it does not tend to occur at all amongst the net workers. They handle nets which have usually been cleaned of slime in the bluestone tanks, and have their hands in and out of the tanks many times a day. It was from this observation that the particular form of treatment outlined below was worked out.

One of the striking points in the study of incidence of the infection is its relation to the different types of fish being handled. As stated, there were no reported cases of fish poisoning during the

Spring Salmon run, and only three during the early Sockeye season. But there was an immediate and marked increase in the number of cases coming in for treatment when the Humpback Salmon started to come in. However, a part of this increase must be regarded as artificial, as during the heaviest part of the run the cannery workers may be employed 16 to 18 hours a day, and through fatigue become careless while cleaning the fish and leave themselves more open to infection through small unattended fishbone pricks and scratches. Nevertheless, in the opinion of the writer, this would only account for a small part of the increase.

Treatment

It should first be explained that the methods of treatment outlined here were found applicable to this particlar infection largely through methods of trial and error, and it must not be inferred that this article attempts to claim any originality in the treatment of infections of the hand in general. But in those cases of infection arising from handling fish, it was found that by the introduction and application of copper salts in solution and ointments, better end results were obtained with a shorter time of incapacitation.

The treatment first used in the infection was conservative, with continuous application of hot magnesium sulfate and glycerine compresses, until definite localization of pus could be demonstrated. This was then incised at the point of maximum swelling, and a plain gauze drain put in and left for 2-3 days. But due to the number of cases in which adequate localization was slow or apparently absent, and the long period of disability occurring while a large slough separated after the incision, leaving a deep wound slow to heal by granulation, a different and more radical method of treatment was attempted.

The fact that those workers whose hands were most often in the bluestone tanks suffered least from the infection, gave the first clue to the treatment. This freedom was in spite of their mending and handling uncleaned nets during the middle of the week as well as clean nets in the weekends, with hands deeply fissured and cracked from the corrosive action of the bluestone solution; a combination that would seem to invite infection. Yet only one very mild case was seen and it cleared up spontaneously.

Following the line of reasoning that if there was an apparent immunity from the infection amongst those whose hands were often in the bluestone tanks, then copper sulfate solution must be a factor in preventing infection. So hot compresses of 50% copper sulfate solution were substituted for the magnesium sulfate and glycerine, with much better results. Later on the idea occurred that if the use of a copper salt in solution was beneficial, then its use in an ointment on a dressing would also be of value, for it was found that plain gauze packing and dressings were somewhat difficult and extremely painful to remove.

The form of treatment finally used routinely in all cases of infection was, in brief, as follows. Owing to the rapidity with which the infection developed, most cases seen on the second or third day were relatively far advanced, though in the majority, there were no signs of a localized collection of pus; the finger being red, swollen and extremely painful, with much accompanying edema of the hand. In these cases a digital nerve block was done, using 2% novacaine with adrenalin, and a deep and extensive incision made over the point of maximum swelling and tenderness, in accordance with methods of finger drainage advocated by Christopher. Hemorrhage was controlled by a blood pressure cuff inflated to around 160 mm. Usually only a serous discharge was obtained with little or no pus, and smears taken from it revealed short gram pos. chains of cocci in the great majority of cases. With this treatment, pain was almost completely relieved, and a smaller slough formed than when compresses were employed until actual pus had localized.

Upon the introduction of hot copper sulfate compresses replacing the mag. sulph. and glycerine ones for 24 hours prior to incision, the irrigation of the incision by 10% copper sulfate solution

immediately upon drainage, and the use of copper citrate ointment on the packing and dressing pad, the formation of a slough was in many cases completely prevented, or at the most, limited to a small and superficial one. The wound healed rapidly by healthy granulation after discharging a slightly purulent serum for 24 to 36 hours. Using this form of treatment, the average time of disability was almost halved.

With the use of routine administration of sulphanilamide, gr. xx, q4h, the general reaction was lessened, and the period of discharge following drainage shortened. The application of moist heat was advocated following drainage, the patient in most cases applying this himself. Three return visits to the dispensary were usually all that were required and the patient was generally back at work by the fourth or fifth day after drainage. These last two facts, together with the early alleviation of pain and the prevention of a further spread of the infection give some indication of the value of this treatment when applied to this particular infection.

Summary

From the above cases and discussion, it will be seen that there is some considerable evidence as to the existence of a specific infection amongst fishermen and others engaged in handling salmon, due to the presence in fish slime of a type of streptococcus of relatively low virulence when compared to the Lancefield Group A strain. While this is only supposition, the existence of a characteristic Fish Strep. comparable to these different strains found in cattle, etc., could be rationally postulated, and would account for many of the unusual features found in this infection. The remarkable incidence and sudden increase in the number of cases associated with a certain variety of fish adds weight to this theory, and it is felt that this condition deserves adequate bacteriological study, since it seems to be so definitely an occupational disease.

The value of copper salts both in solution and in ointments has been proven in this condition. Whether it is of any value in the treatment of infections of the extremities caused by streptococci of other strains remains to be seen. Certainly the reduction in time of incapacitation of the patient, his early relief of pain, and the more satisfactory progress and end result obtained by the use of these methods, seemed to warrant their publication despite their deviation from accepted practice.

The writer wishes to express his deep appreciation to Dr. Cade of Prince Rupert for many suggestions in the handling of this and other problems during the past summer; to Dr. A. G. MacKinnon of the Vancouver General Hospital for the contribution of a number of case histories and much valuable comment and criticism on this condition; and to Dr. A. A. Armstrong, Medical Superintendent of the Port Simpson General Hospital.

ON DISINFECTION WITH CARBOLIC ACID VAPOUR

"Although fully alive to the importance of the use, in hospitals, of an agent so inimical to the lower forms of life, Dr. Lemaire does not suggest any method of constantly supplying it to their atmosphere. I am induced to make a memorandum of it, because their being no doubt of the efficiency of carbolic acid as a disinfectant, an easy method of disseminating it is alone requisite to ensure its more frequent use in circumstances which so often occur, in which not one isolated act of disinfection is required, but a continuous process. Such circumstances are found in hospitals, we may say in all hospitals, but especially those in which lesions of surface exist, such as surgical and lying-in hospitals; and those in which infectious diseases are treated, such as fever, smallpox, etc. In those institutes a permanent apparatus ought to be contrived. Private practitioners also require this perpetual atmospheric disinfection."

Dr. James B. Russell,

Glasgow Med. Journal, Feb., 1869.

[This article appeared about the time Lord Lister published his paper "On the Antiseptic Principle in the Practise of Surgery."—Editor.]

MIGRAINE

By MISS LILLIAN KARMALSKA, '41

The human ill most widely found during all time and among all people is, without doubt, headache, an important variety of which is that seen in the syndrome known as migraine. Migraine may be defined as a periodic, usually incapacitating, unilateral headache, accompanied by visual disturbances, by nausea and vomiting, followed by sleep, and occurring against a background of relatively perfect health. Attacks vary in number from several a day to one in every one or two years. They sometimes occur shortly before menstruation or alternate with it, and are rarely present in parturient amenorrhea. Fifty per cent of cases develop between 20 to 30 years of age, but it has been described in children of two and may appear as late as the sixth decade. The character of the pain varies in individual cases from the localized bursting or throbbing headache to the involvement of the face, neck, shoulders, or even upper extremities. Sensory stimuli of any kind accentuate the discomfort. Marked salivation and perspiration may accompany the vomiting.

There are organic lesions of the nervous system which produce periodic headaches that may closely resemble migraine, but a careful investigation will generally reveal signs and symptoms indicative of the cause. Thus in a case of brain tumor causing a localized headache, the side of the pain is not likely to vary, whereas in migraine, the headache usually varies, being left-sided for a period, then at another time becoming right-sided. In every case presenting itself with headache, carefully inquire into the location, the duration, and the character of the headache as well as into the conditions which relieve it or aggravate it.

A case reported by Hyland and Douglas will make these points clear (2).

A female patient aged 26 had been subject since childhood to periodic headaches of a throbbing character. They always occurred on the right side at intervals of 2-3 weeks, lasted from several hours to a day and during the past three years had increased in severity and frequency. They were brought on and aggravated by eye strain, exposure to strong lights or bright sunshine. A short time before admission, she had noticed spots dancing before her eyes; there were no visual hallucinations. Nausea was common but vomiting rare. Several hours of complete rest in bed with eyes closed was the only measure effective in giving relief. There was no relation to the menstrual cycle; no history of epilepsy or of migraine.

This is a typical history of migraine headache and were it not for the finding of a loud bruit over the right temporal and occipital regions, a diagnosis of migraine would have been quite logical. In addition, a left superior-quadrant field defect showed that the inferior part of the right optic radiation was encroached upon, probably by a tumor. Operation revealed an arterial angioma in this location.

Classification

Migraine may be classified as first, *angio-spastic*, due to overaction of the vessel musculature, in which the picture presents dilated pupils, a cold pale face and salivation; and second, *angio-paralytic*, due to paralysis of vessel walls, with congestion of the face and ears, uni-lateral or bi-lateral ptosis, contracted pupils and generalized perspiration.

Another classification of migraine based on the major clinical manifestations is as follows:

(1) Hemicrania simplex—in which headache is the main symptom.

(2) Ophthalmic migraine—in which eye symptoms, varying from a partial field loss to a luminous discharge of many patterns, may predominate. Within these, vision is dimmed by bright scintilation, which ends in various ways after lasting for a quarter hour or so. As they cease, the headache comes on, generally, on the opposite side of the head. Gubler in 1860 first introduced this sub-division of migraine.

(3) Ophthalmoplegic migraine—in

which we get a paralysis of the third cranial nerve. The pain is usually situated deeply behind the eye, or just over the eye. The paralysis may last from two days to a week. Brumwell has found that in many of these cases, there is a congenital aneurysm of the carotid artery pressing on the ophthalmic division of the v nerve.

(4) Facioplegic migraine—which is believed to be a facial nerve neuralgia.

(5) Abdominal migraine—in which gastric symptoms including epigastric pain, vomiting and diarrhoea are especially noticeable, due supposedly to a disturbance of the vagus nuclei in the medulla.

(6) Psychic migraine—which is characterized by mental confusion, impaired memory, depression, ill humour and terror hallucinations. Tissot reported cases in which the patient had a feeling of strangeness, unreality and mental confusion but in whom there was a marked absence of headache. He labelled these cases as "psychic equivalents" of migraine.

Heredity

The familial character of migraine has been emphasized by all writers. It has been traced directly through four generations of one family. There is believed to be an inborn predisposition to pathological neurometabolic processes, described as an "inherent neurotoxic diathesis". According to Flateau, migraine is usually inherited through the mother. In his studies he found 79% of cases with a maternal heredity, as compared with 21% of paternal incidence. Moreover, the incidence shows a preponderance in the female in the ratio of 21:1. Allan (3) however, claims that his investigations yield the ratio 1.3:1, thus contradicting Flateau and upsetting any tendency to the presumptive evidence of sex-linked heredity. Migraine appears more frequently in descendants of individuals suffering from convulsive disorders than do convulsive attacks themselves. (4.14). Its association with family periodic paralysis has attracted considerable attention. Holtzapple believed that both were equivalent one with the other, and that each was a manifestation of a similar, although entirely unknown causative agent. Without definite proof he thought the two disturbances depended on vascular changes, one in the cerebral system, the other, in the spinal circulation. Ball, on the other hand, has investigated the possible transmission of some allergic factor. Although his results must be regarded rather conservatively because he used no controls in his investigations, he noted a suggestively high incidence of allergic phenomena; asthma, hay-fever, urticaria and eczema, in his patients.

Etiological Theories

The idea that a vasomotor effect is the underlying cause of migraine is not by any means a modern one. Anhalt in 1724 suggested that the vessels were affected by a chyle of poor quality which altered their form and made them contract, or dilate. Tissot pointed out that vomiting would often come at the end of an attack, that dyspepsia would aggravate it while "stomachics" would relieve it. He concluded that somehow the irritation must pass from the stomach to the trigeminal nerve, and result in the symptoms already described. That *arterial spasm* may be the causative factor, is at least suspected by the contraction of the peripheral arteries which commonly attends the syndrome. The headache itself is caused by hypotonic dural arterioles which dilate and stretch the peri-arterial nerve plexuses (5).

Spriggs suggested that there is an antigen of some sort (possibly in food) which combines with anti-bodies in the endothelial cells of the vessel wall, causing liberation of histamine with consequent vasodilatation, and localized oedema. Attacks of migraine are often excited by disturbances of digestion, or dietary excesses, especially by rich foods or by alcohol (8). In 63 cases of chronic and frequent headache, Kennedy found 69% were greatly lessened or failed to reappear after certain foods were eliminated from the diet, but recurred when these were deliberately eaten. He believes

that the morbid process in migraine is a *localized allergic oedema* painfully implicating the meninges, especially their foldings and angled reflexions. This would be exceptionally severe if there were coexistant adhesions between cortex and dura. Rubenstone contends that thyroid dysfunction or hypofunction may be the basis of migraine and the prime cause of the allergic manifestations (6). The *duodenal stasis theory* has not been substantiated by x-ray. It postulates that the disturbance chiefly occurs in the second or third parts of the duodenum; even if it did, it would not directly cause the migraine, but act through the production of altered conditions of digestion, and of upset liver function, with elaboration of toxic substances. Improvement after sodium sulphate was introduced by duodenal tube into the intestine has been reported.

Examination of the urine of female patients with migraine showed that oestrin was either absent, or if occasionally present, always in less amount than the normal value of 20-30 units. Prolan was found in 6 out of 15 cases. Usually such a state of affairs is seen only in cessation of ovarian function. These results would seem to point to a *hormonal cause* of migraine. Riley, Buckner, and Kurzork, injected intramuscularly 2 c.c. of a preparation containing prolan, to see if artificial introduction of the hormone would result in production of migraine (1). Within 4 to 12 hours, headache developed in 7 out of 9 of his patients. In most of the naturally occurring attacks, they noticed the appearance of prolan in the urine for several days in advance of the symptoms, terminating just before or concomitantly with their development. In a few of the cases, though, no prolan-headache relationship was demonstrated. But, why then, is there cessation of attacks during pregnancy when Prolan is normally present in the urine? Some explain it with the belief that the Prolan is not produced by the pituitary but by chorionic epithelium. Another explanation is that a necessary additional factor is non-operative during pregnancy.

There is a possibility that the pituitary gland is involved and prolan is only an accidental bi-product, with no connection with the migraine. Timme attributes all to the *swelling* of the *pituitary* within an abnormally small pituitary recess (7). This has not been borne out at the few post-mortems that have been performed on migrainous individuals. He believes that pressure on the optic chiasma, the cranial nerves III, IV, VI, and the ophthalmic division of V, explain the cranial symptoms, while over-function of the pituitary accounts for the systemic ones.

The Migraine Disposition

Country people and those working out of doors are much less likely to be affected than dwellers in large cities, especially those whose work is chiefly mental, or distasteful to them. Subjects of migraine generally have a high strung disposition and throw themselves with undue energy into all they do whether work or play. As a rule, they are very competent in their work and amongst the sufferers are many outstanding personalities. The children are shy and withdrawn, but often possess unusual stubbornness elicited by particular situations. Nine-tenths of the adults are ambitious, exceedingly conscientious, hard working, and show a great deal of push. Sexual mal-adjustments occur especially in women. The personality features may be quite common and not at all pathognomonic of migraine, but in certain situations they call forth pernicious emotional upsets which in those subject to migraine, may precipitate an attack (9).

Differential Diagnosis

Before treatment begins, you must be sure of a correct diagnosis. Eliminate all organic lesions, whether neurological, in the sinuses, eyes, or teeth. Since the disturbance is a variable symptom-complex rather than a definite disease entity, cases failing to present one or other of the characteristics described above must not fail to be recognized.

Migraine is diagnosed by exclusion (10). Exclude—intracranial aneurysm

which is mistaken for ophthalmoplegic migraine, cardio-vascular disease, intracranial neoplasm, syphilis of the nervous system, endocrine disturbances and psycho-neuroses. Headaches may be caused reflexly from diseased sinuses, teeth or from eye strain, and they can as a rule be easily differentiated from migraine. The most difficult differential is a neurotic headache. It is generally described as a band-like constriction around the head.

The four cardinal components of the migraine syndrome are:

1. Recurrent headache, preferably, but not necessarily, hemicranial.
2. Associated visual symptoms, classically scintillating scotomata.
3. Gastro-intestinal symptoms, usually nausea and vomiting.
4. History of migraine or epilepsy in the family.

And finally the therapeutic test with ergotamine tartarate, a specific for migraine headache, may be used. The possibility of one of the above causes superadded to a migraine headache must not be overlooked, but these cases are not common.

Treatment

Treatment may be divided into relief of the headache and prevention of the headache.

Relief of the Headache. The best relief for migraine headache is furnished by ergotamine tartarate (called gynergen). This is not a cure but will prevent the headache in over 90% of cases. It may be administered in a single dose of 1-5 mg. per os followed by 1-2 mg. every hour up to a total of 10-12 mg. This is sufficient for the milder attacks. A single subcutaneous dose of 0.25 to 0.5 mg. gives relief in 15-45 minutes. It must be given within a ½-hr. from the beginning of the headache to be of any use. Atropine sulphate, 1/150 to 1/100 gr. per os or by injection, helps to relieve the resulting nausea and vomiting. Daily prophylactic dosage is valueless.

Accessory symptoms which alarm both patient and doctor occur not infrequently after intravenous injection of ergotamine tartarate, less so after subcutaneous or intra-muscular injection (11). The most common symptoms in their order of frequency are nausea, vomiting, numbness or tingling of the hands and feet, muscle pains and stiffness. They constitute a warning to discontinue therapy only if prolonged and persistent. Contra-indications to ergotamine tartarate include sepsis, especially if associated with intravascular foci, obliterative vascular disease, especially coronary, while cautious treatment must be employed in marked arteriosclerosis and in hepatic or renal disease. It is a specific for the cranial symptoms of migraine and produces no effect on the nausea and vomiting, in fact it may itself cause vomiting. Observations suggest that ergotamine causes a hypertonicity or active vasoconstriction of the dural and temporal arteries in the process of relieving a migraine headache (5), with no effect on pial and cerebral vessels.

Prevention of Headaches. Workers at the Bellevue Hospital in New York kept an elaborate system of charts including a detailed account of the symptoms and the therapy which yielded most relief. Those who were favourably influenced by the same treatment were closely examined for any similarities in symptoms which could be used as a guide to future therapy. In this way, the complex migraine group was broken down into several therapeutic groups (12).

Thus emmenin, in doses of 2 drachms daily increased to 4 drachms daily before the menstrual period, was of benefit to those women whose headaches were definitely related to the menstrual flow.

Those patients with a positive history of allergy, hives, or a positive skin test were given calcium gluconate and viosterol daily; this seemed to diminish the severity and frequency of the attacks and was of particular benefit if nausea and vomiting were severe.

Pituitary extract was beneficial to those patients with large bones, thick noses, thick grimy skin. These pituitary headaches were also associated with menstruation and at times gave allergic stigmata as well.

Glucose enemata, duodenal lavage and

non specific protein therapy have all been resorted to. Surgery of the sympathetic nervous system has been tried (13), but this seems a rather radical treatment when so little is known of the cause of migraine.

Sedatives, especially luminal in ¾ grain doses every night have been found helpful.

Gower's Prescription has also been beneficial:

Liquoris Trinitrinae	m.i
Sodii bromidi	gr.x
Tincturae Nucis vomicae	m.x
Nitrici Acidi	m.v
Tincturae Gelsemii	m.x
Aquae Chloroformi	ad. oz. ss.

Ex aqua, ter in die, post cibos.

This must be given constantly to be of any use.

Psychotherapy and adjustment of cases to the environment, with a detailed explanation of the problem in hand is of great value in those individuals possessing a migraine disposition.

Summary

(1) Migraine is a unilateral hemicranial headache which may present a variety of symptoms.

(2) Differentiate it from headache of sinusitis, eye strain, bad teeth, neuroses and brain tumor.

(3) Migraine is classified under six headings according to the preponderant symptoms.

(4) It shows an hereditary tendency, and some believe it to be sex-linked through the mother.

(5) Theories as to the origin consist mainly of angiospasm, allergy, duodenal stasis, enlarged hypophysis, and hormonal upset.

(6) The migraine disposition must be recognized and considered in treatment.

(7) Drug therapy is varied but those yielding best results are luminal, codeine, and most especially, ergotamine tartarate given by mouth or subcutaneously.

(8) Emmenin has been found beneficial in attacks related to menstruation.

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AIDS IN THE DIAGNOSIS OF EARLY PULMONARY TUBERCULOSIS

By P. R. BLAHEY, B.A., '41

In the course of the study of diseases of the chest, one is impressed by the importance of early diagnosis of pulmonary tuberculosis. Difficulty is frequently experienced in the evaluation of the symptoms and signs presented by the patient.

Morbidity and Mortality

The incidence of tuberculosis is highest in young adults. It is low between the ages of five and fifteen years but becomes the chief cause of death from fifteen to forty-five years (excluding violence and accidental death as causes). Susceptibility rises very abruptly from the late 'teens to reach a maximum at twenty-one, then declines to one half the rate at twenty-five. This decline is less rapid in the female, perhaps due to the effect of pregnancy on the course of the disease.

Extent of Disease at Time of Diagnosis

When the diagnosis of pulmonary tuberculosis is made, the disease is advanced in 60% of cases, moderately advanced in 25%, while only the remaining 15% show minimal lesions. Tubercle bacilli were demonstrated in the sputum of 65% of cases. Repeated sputum examinations may be reported negative in cases which on occasion are positive. In these it is justified to consider the duration of expectoration more important as an index of infectiousness than the incidence of positive sputum.

At six years of age, over 50% of contacts react to tuberculin, but when the contact is with an expectorating patient for the same period of time, almost 100% show a positive reaction. Following one year's exposure with or without expectoration the morbidity of contacts is 20% and this percentage does not increase appreciably after the one-year period. This would indicate the necessity of examining contacts within one year of exposure. Some contacts who show no demonstrable lesion at the first examination, break down later. Repeated examinations are therefore imperative.

The diagnostic essentials include a complete history, physical examination, tuberculin test, laboratory procedures and X-ray studies.

History of Illness

The plan of history taking is suitably given in the students' "Outline of History Taking", paying particular attention to exposure, date of possible onset of the disease and the period of break-down. It should be noted that almost 80% of the patients acquire the infection without known exposure.

(*a*) *Onset*:

The onset of symptoms is often indefinite and extremely difficult to determine. It comes on as a rule in a slow, insidious manner, so that the person concerned is scarcely able to appreciate its presence until the time comes when he can no longer carry on his work and actually falls sick, or some drastic event occurs to bring the trouble to his notice. Often the onset is followed by a period of good health before the recurrence of illness which precedes the break-down. About one-third of the patients are diagnosed within one year of the onset and half of them in the first six months. This number declines rapidly with a prolongation of the time after exposure. Many remain relatively symptomless with a history of ten years or more.

(*b*) *Break-down*:

The interval between the first known symptom of onset until the individual can no longer carry on his activities, which is known as the break-down, varies widely from a few weeks to many years. The average is slightly over two years. About one-third of the patients have not had

a break-down in spite of the fact that almost 65% of these have an advanced form of disease. The number of chronic pulmonary cases is higher in the patients with the history of a break-down. It seems evident that a large proportion of people have such a high tolerance for tuberculosis that they carry it even to an advanced stage of break-down.

Complaints

(a) Voluntary:

The entrance complaints as volunteered by the patient and not elicited by any leading questions vary greatly. Only a very small number (2%) volunteer no complaints in spite of the fact that they may have advanced disease, as shown by physical and X-Ray examination. The volunteered complaints are often (14%) not referable to the chest. The order of frequency of entrance complaints is cough, weakness and fatigue, pain in the chest, various abdominal disturbances, dyspnoea, loss of weight, haemoptysis (including slight tinging of sputum to a haemorrhage of a gross degree), laryngitis, sweating, persistent colds, headache, nervousness and sleeplessness. The presence of these symptoms together with its variability in different cases indicates the chronicity of the disease dealt with.

(b) On Questioning:

By asking leading questions it is found that the patient not infrequently leaves out the more important complaints by not himself realizing their significance. A dramatic occurrence such as haemorrhage is more important to the patient than the sense of gradually incurring fatigue or loss of weight. If a patient receives considerable rest, then complaints such as dyspnoea, fatigue and nervousness may scarcely be noticed. The catarrhal type of onset is most commonly seen and a recurrence of catarrhal symptoms in contact patients is very indicative of tuberculosis. The most prominent and reliable symptom is that of pleurisy. It occurs twice as frequently as that of haemorrhage and blood spitting and four times as frequently as chills and sweating. Symptoms below the diaphragm should not be dissociated from the lung disease, for, while sometimes due to abdominal tuberculosis they are in many cases due to the toxaemia of the disease. These varied but pointing symptoms should lead us to think of the possibility of tuberculosis and however vague they may be, if no cause is found, every endeavour should be made to rule out the possibility of this disease.

Physical Examination

Physical examination should be conducted routinely and accurately. Its importance and procedure will not be dealt with here. It is, however, well to remember that idiopathic pleurisy with or without effusion and spontaneous pneumothorax are to be considered due to pulmonary tuberculosis until proven otherwise.

Tuberculin Test

A positive test indicates that the patient has come in contact with the tubercle bacillus and the tissues have become sensitized to it. Special attention is paid to the more recently acquired positive reaction. With the stamping out of tuberculosis tuberculin testing in case selection is of increasing importance. It obviates the necessity of referring to clinics those patients with other signs of tuberculosis and also aids in the elimination of non-infected contacts.

Laboratory Procedures

(*a*) *Sputum*:

Direct smear and culture or guinea pig inoculation, repeated if necessary, are fundamentals in each uncertain case. Positive results are found in 60% of the patients.

(*b*) *Sedimentation Test*:

An increase from the normal indicates an increase of protein catabolism. As a laboratory finding without any X-Ray studies and in the presence of other evidence of tuberculosis, it is a gauge of the pathological activity of the disease. Numerous observers consider that a sedimentation rate which is above normal and below 15 (mm. per hr.) is indicative

of a slight infection whether recent or healed. A rate above 30 is indicative of a very severe infection.

(*c*) *Leucocyte Picture*:

It is a measure of activity in pulmonary tuberculosis. The greater the percentage of immature neutrophils present, the more severe is the infection or the greater is the tissue damage. In slight infection, a percentage of 16 to 30 of immature neutrophils has been observed. In severe infections this percentage rises to a level between 50 and 70, while a level above this signifies impending death.

(*d*) *Lymphocyte—Monocyte Ratio*:

This is considered by numerous observers (6) to be a delicate test for measuring the resistance of the host to its invader. The theory is that an increase of monocytes is an index of dissemination of the disease and an increase of lymphocytes an index of resistance. The brunt of the attack against the tubercle bacilli is largely borne by the monocytes. When the number of monocytes is high, it is considered that new tubercles are forming. The lower the percentage and total number of lymphocytes the graver is the outlook for the patient, regardless of whether the monocytes increase, decrease, or remain stationary. An increase or a progressive rise in the number of lymphocytes with a normal percentage of monocytes is indicative of progressive healing. In tuberculous patients, after induction of artificial pneumothorax, there is often a marked increase of lymphocytes.

(*e*) *Serological Tests*:

These are dual serial tests including the tuberculo-complement fixation and the Caulfield inhibitive reaction. The tests, it is said by several supporters (4), when carried out in all patients with a positive tuberculin reaction, especially in those subject to reinfection, will detect preclinical tuberculosis months and years before evidence of clinical disease may be shown by physical, x-ray or sputum examination. Blood is taken as for the Wasserman reaction and is delivered to the laboratory. This is repeated each month unless there is satisfactory evidence from previous samples that no lesions are supected, when the interval may be extended to half a year. Frequent readings are taken and a deviation from the normal serves as a justified warning to restrict the patient's activity. The serological tests differentiate between those who are liable to develop tuberculosis and those who are not. It indicates that infection is no longer dormant and the second stage is reached which, if not treated, will ultimately lead to active clinical tuberculosis.

X-Ray

Stereoscopic readings lead to a more accurate and certain diagnosis than a flat plate.

(*a*) *Distribution of lesions*:

Apical (above second rib anteriorly) 50 per cent.

Central (second to fourth rib level anteriorly) over 30 per cent.

Basal (below fourth rib level anteriorly) under 20 per cent.

The major lesions are more frequently seen in the apex than in the central and basal regions. together. The incidence of primary nodules is the same on both sides. Practically all are in relation to the periphery of the lung and more frequently in the basal than in the apical region.

(*b*) *Tuberculous lesions*:

In tuberculosis the lymphatic system is primarily involved, producing congestion, fibrosis, calcification and caseation of the lymphatic glands with some congestion of the air cells and bronchi. The first infection is nearly always in the periphery of the lung with a reaction secondly in the regional glands of the hila and mediastinum.

The early lesion on an X-ray plate is a parenchymatous greyish shadow commonly known as a "finger print density". These are multiple in miliary tuberculosis. An increase in density is due to fibrosis and calcification of the area. These densities may coalesce or enlarge and caseate in the centre with a peripheral zone of increased density which is opaque to X-rays. When this ulcerates and drains into a bronchus, a fluid level is seen.

Pleurisy is revealed on the plate as a uniform haziness or density along the entire base of the lung which rises to the level of effusion and then gradually fades into the normal lung. The upper border of this haziness gives an impression that it is semi-lunar in shape, i.e. being higher at the mediastinum and at the periphery of the chest wall. Normally the pleura is not seen but a thickening with fibrosis and a resulting increase in density makes it more apparent. Pleural thickening is best seen along the margin of the chest wall. At times the pleura may be so dense that it obscures the entire lung field. The presence of a fluid level in pneumothorax is a more apparent finding.

Disturbances of the bony framework and a shifting of mediastinum and trachea should be noted.

(*c*) *Differentiation from chronic chest disease secondary to sinusitis*:

Not infrequently patients have a symptom-complex very similar to tuberculosis which is found to be due to chronic chest disease secondary to upper respiratory infections. In this case the hilum of the lung becomes a mass of connective tissue and later the congestion and fibrous tissue progressively spread outwards along the bronchi and arteries. The lymphatics are not especially involved and the increase in size of the lymphatic glands is absent. The X-ray picture consists of an increase in the density of the hilum and confluent with this is a triangular shaded area along the border of the mediastinum and diaphragm. In this area the peribronchial and perivascular markings are increased and combined with which are greyish shadows at the base of the lung. This type of picture is differentiated from the tuberculous lesions whose genesis is entirely different.

Summary

1. The necessity of a complete history has been stressed.

2. Various laboratory procedures and X-ray findings in the diagnosis of pulmonary tuberculosis have been briefly discussed.

The author's sincere thanks are due to Dr. R. G. Ferguson who forwarded much of the literature and to Dr. H. K. Detweiler for his helpful criticism of the article.

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MEDICAL SOCIETY NOTES—1884

In the minutes of January 25th, 1884, the following motion appeared, "Resolved, that as far as the students of The Toronto School of Medicine are concerned, the statements published in the *World* of January 24th are false in every particular, as there is not the slightest dissatisfaction among the students regarding the management of either the School or the Toronto General Hospital, and that a copy of this resolution be sent to the *Toronto World*."

On December 14th, 1883, nine months after Koch had demonstrated the etiology of tuberculosis, there was a debate on the subject, "Resolved, that Phthisis is contagious." In spite of Koch's demonstration it would appear that the opposing debaters presented their arguments the more forcibly, for by a majority vote the decision was given in favour of the negative!

The Early Records of the University of Toronto Medical Society.

By J. H. Elliott, M.D.,

U. of T. Med. J., May, 1932.

SPRAIN OF THE ANKLE JOINT

By D. P. BRYCE, '42

Of all traumatic injuries to an extremity, sprain of the ankle joint is probably the most common. Thus it is of importance for every medical student to have a working knowledge of the nature and treatment of this lesion.

Anatomy of the Ankle Joint

In order to understand a sprain of a joint, a knowledge of its anatomy is essential. The ankle joint is a hinge-joint. The lower end of the tibia and its malleolus, the malleolus of the fibula, and the inferior transverse tibio-fibular ligament, form a mortise for the reception of the body of the talus, and the whole is bound together with ligaments allowing only for flexion and extension of the foot on the leg.

Bony Parts

1. *Lower end of tibia*

The rounded subcutaneous medial portion of the lower end of the tibia projects downward and forms the medial malleolus. The tip of the malleolus is roughened for the attachment of the deltoid ligament of the ankle joint. Its lateral surface is smooth and covered by a comma-shaped articular facet, articulating with the upper 1/3 of the medial aspect of the talus. Its medial surface is convex and subcutaneous.

The inferior surface of the lower end of the tibia is smooth for articulation with the talus. It is wider in front than behind, concave from before backwards, and slightly convex from side to side. The articular surface is continuous medially with that of the lateral surface of the medial malleolus.

The anterior surface is rounded and continuous above with the anterior surface of the bone; the posterior surface is rounded, grooved by the tendon of the tibialis posterior muscle, and projects downwards posteriorly to form a flange.

The lateral surface is formed by a triangular "fibular notch", whose borders meet above in the interosseus crest, and whose floor is roughened by the attachment of the interosseus tibio-fibular ligament.

2. *Lower end of Fibula*

The fibula is subcutaneous in the lower third of its lateral aspect, which is enlarged and projects downward as the lateral malleolus. The lateral malleolus projects ¾" below and posterior to the medial malleolus. Its tip and anterior borders are roughened for ligamentous attachments. Its posterior border is grooved by the peroneal tendons and its lateral surface is subcutaneous. The medial surface bears a triangular articular facet for the talus, and behind this the malleolar fossa gives attachment to ligaments.

3. *Talus*

The talus is divided into neck, head and body, and it is to the neck and body we will confine our description.

The neck is a constricted part of the bone set obliquely, and connecting the head and body. Its roughened surface gives attachment to ligaments, extends backwards further medially then laterally, and bears on its inferior surface a deep groove or "sulcus tali".

The body is cuboidal. Its superior aspect articulates above with the tibia, and thus is convex from before backwards and slightly concave from side to side. It is wider before than behind. The lateral aspect articulates with the lateral malleolus; the medial aspect articulates above with the medical malleolus, and below is roughened for ligamentous attachments. The posterior surface is grooved and presents the posterior and medial tubercles, while the inferior surface articulates with the upper aspect of the calcaneum.

Ossifications

The epiphyseal centres of the lower end of the tibia and fibula appear in the 2nd

year and fuse in the 18th year. The epiphyseal line of the tibia runs just above the attachment of the joint capsule including the medial malleolus and the articular surface.

The epiphyseal line of the fibula is lower, includes the lateral malleolus and is on a level with the articular surface of the tibia.

Ligaments

The *capsular ligament* lined by synovial membrane is thin, loose and bulging in front and behind to allow of free hinge movement, and is attached to the borders of the articular surfaces of the tibia and malleoli above, and to the talus below.

The *anterior ligament* is broad, thin and attached above to the anterior margin of the lower end of the tibia, and below to the talus in front of its superior articular surface. The posterior ligament is weak and of little importance.

The *deltoid ligament* arises from the blunt end of the medial malleolus, and has a superficial fascicle passing downwards and backwards to the upper part of the side of the sustentaculum tali, and a deep part attached to the whole non-articular part of the medial aspect of the talus, and spreading forward along the sustentaculum tali to reach the navicular bone.

The *lateral ligament*, of special importance in this paper, has three parts:

(*a*) *calcaneo-fibular*, which is a cord passing downwards and backwards from in front of the tip of the lateral malleolus to a fullness on the side of the calcanium.

(*b*) *posterior talo-fibular*, passing medially and backwards from the malleolar fossa to attach to the posterior tubercle of the talus.

(*c*) *anterior talo-fibular*, passing from the anterior border of the malleolus forward to the neck of the talus just anterior to the articular facet for the malleolus.

The *inferior transverse ligament* stretches from the upper part of the malleolar fossa of the fibula, to the posterior border of the articular surface of the tibia about as far as the medial malleolus. This ligament forms part of the articular surface for the talus and helps to form a posterior flange.

Mechanics of the Joint

Muscular pull and gravity tend to displace the tibia and fibula forwards on the talus. This is counteracted by the wedge shaped arrangement of the bony parts, the flange formed on the posterior articular border of the lower end of the tibia and the strong collateral ligaments passing downwards and backwards as indicated. Of the ligaments, the weakest is the anterior talo-fibular ligament, and as we shall see, this is most often injured in ankle sprain.

Relations

In front, the anterior tibial vessels and nerve are midway between the malleoli, with the tendons of the tibialis anterior and extensor hallucis longus medially, and of the extensor digitorum longus and peroneus tertius lateraly.

Behind, the flexor hallucis longus tendon lies midway between the malleoli in a groove, with the tendons of tibialis posterior and flexor digitorum longus behind the medial malleolus, and the tendons of the peroneus longus and brevis behind the lateral malleolus. The posterior tibial vessels and nerves lie between the tendons of the flexor digitorum longus and flexor hallucis longus.

Acute Sprain

Etiology

The common cause of an acute sprain is turning of the foot while it is bearing weight, as for instance when running on uneven ground. However, the injury may also be sustained from a fall.

Pathology

Usually the foot is suddenly turned inwards, so that the lesion is limited to the external lateral ligament, and especially the anterior talo-fibular and calcaneo-fibular ligaments. The posterior talo-fibular ligament is seldom injured. The ligament may be

1. torn across.
2. torn away from the bone at either of its attachments.

3. partially torn or stretched.

Along with the lesion of the tendon is a varying degree of extravasation of blood into the surrounding parts, effusion of fluid into the joint cavity, and stretching of the tendons and soft tissues on the lateral surface of the ankle and lower leg. Rarely other ligaments of the joint are affected with a similar pathological sequence.

Diagnosis

History

The patient will complain of an injury to the ankle due to twisting or falling, accompanied by pain first at the outer side of the ankle, and later in severe cases, extending to involve the entire foot, ankle, or even leg. This pain persists even when the ankle is at rest.

There will be more or less inability to bear weight, although in mild cases the patient may be able to walk with difficulty.

Physical Examination

There will be a variable amount of swelling and ecchymosis, which is usually seen inferior to the external malleolus, but which in severe cases may be much more extensive. The foot is not displaced on the leg although the swelling may suggest it.

On palpation there will be acute tenderness in the region of the lesion, usually anterior to and below the lateral malleolus, as well as tenderness around the joint and lower half of the lateral side of the leg. Movements are possible except as limited by the swelling, but are usually painful especially on adduction of the foot. An important point in the differential diagnosis of sprain and fracture, is that in a sprain the foot may be pushed directly upwards against the articular surface of the tibia without pain; whereas in fracture there will be pain at the site of the break.

X-ray is not necessary in mild cases, but should be used in all moderate or severe sprains in order to rule out fracture of the malleolus without displacement, or sprain fracture with avulsion of the tip of the malleolus.

Treatment

The treatment depends upon the severity of the sprain. If it is severe the patient should be put to bed with the ankle elevated and immobilized in a pressure or hot wet dressing, until the swelling has subsided.

A good pressure dressing may be applied as follows:—

Cover foot, ankle, and lower third of leg with absorbent cotton 1½"-2" thick. The cotton is then covered with a tight gauze bandage which holds the foot in a position of eversion. Thus is elastic pressure obtained. Flannel or woven elastic bandage may replace the absorbent cotton, or it may also help to apply heat locally.

After 3-4 days in bed, the pressure bandage is removed, the foot washed in alcohol, and a light circular plaster cast or adhesive strappings applied.

In mild cases the preliminary rest period may be dispensed with. Two common types of strappings are outlined below:—

1. Stirrup and basket

While being applied the foot should be supported, dorsiflexed and everted. This may be accomplished by having the patient press his heel on the surgeon's knee, and pull on a strip of adhesive, which is attached to the ball of the injured foot from within outwards. With strips 1" wide, the first strip begins on the inner side of the leg about 6" above the ankle, passes down under the heel and up the other side of the leg to just below the knee. The second strip begins on the inner side of the foot, is carried back around the heel and forward superficial to the first strip, and parallel to the sole along the lateral side of the forefoot. Thus alternate strips are applied which overlap slightly forward, until sufficiently forward when the vertical strips may be curved around the lower leg, and the foot, ankle and lower leg are firmly incased in a adhesive bandage.

The strapping is covered with gauze and the patient allowed to walk. A ¼"-½" elevation may be applied to the outer side of the heel of the shoe to good advantage.

2. Stirrup

The foot is placed in a position midway between eversion and inversion, and in full dorsi-flexion. This is achieved again by the patient pulling on a strapping looped about the ball of the foot, while the heel is resting on the surgeon's knee.

Three bands of 1″ strapping, slightly overlapping, are applied to the lateral side of the leg, parallel to its long axis, so that they stretch from the ball of the foot to just below the knee, and so that their overlapping breadth extends from immediately posterior to the base of the 5th metartarsal bone anteriorly, to the lateral aspect of the fibula posteriorly. Circumferential strips are applied to the upper extremity of the strapping.

If strips have been applied with sufficient tension, a bevelled piece of piano felt cut to fit the ankle below the lateral malleolus may be slipped into place, deep to the adhesive strips. Circumferential strips are applied above the malleolus.

An elastoplast type of bandage is now applied under moderate tension from the roots of the toes to just below the knee. This prevents oedema, increases support, and prevents the strapping from slipping. The patient is now encouraged to use his ankle freely.

The strappings are worn until they become loose and ineffective in about ten days; then they must be changed. The swelling is gone usually by the end of a week, but 4-6 weeks or more are necessary for complete healing in severe cases. Treatment should be continued until the joint is perfectly restored, or weakness may result from too early use.

If a tip of the malleolus is torn off a plaster boot is necessary for about a month, and then treatment is applied as indicated above.

Chronic Sprained Ankle

A lesion of this type may be due to:—

1. an acute sprain which has not been given time to recover properly.
2. inherited weakness associated with some unbalance of the foot, which is subjected to constant strain.

The chronic sprained ankle may be divided into three main types:—

1. In this type there is no swelling, discolouration, or inhibition of free movement, except that there is experienced a dull pain on inversion of the foot, or pressure on either attachment of the external lateral ligament. This is believed to be due to a chronic periostitis set up at the site of the attachment of ligament and bone, due to trauma.

The treatment is the use of a corrective boot with an outer sole wedge, and application of local heat followed by massage with iodine ointment.

2. This second type has been called the "fat ankle", and is characterized by a disfiguring enlargement about the external malleolus which swells particularly at night. These swellings can be picked up and moved over the underlying tissues, and are lipomata, which have resulted from one severe or several mild sprains in which the hemmorhagic effusion has been incompletly absorbed.

The treatment is surgical removal when desired.

3. In these cases there has been a definite ligamentous tear, with resulting indentation below the lateral malleolus. Sometimes there may be an exostotic growth on the anterior part of the talus, in such a position as to block dorsiflexion.

The exostosis may be removed surgically but little can be done to reduce the deformative indentation.

Treatment of Acute Sprains by Procaine Infiltration

This is a method of treatment originated by Leriche which has received a good deal of attention recently. Regardless of the theory of the treatment, which is not generally accepted, the method itself seems to have good results and is very worth while in some cases at least.

The technique is to infiltrate, by injection, with ½ to 2% procaine, the periarticular tissues of the sprained joint. Ten to fifteen cubic centimetres of the drug are usually sufficient. In very severe cases several injections may be necessary but one dose treats most cases of sprain.

Immediately, according to the observ-

ers, there is relief from pain, cessation of swelling, and complete mobility of the joint. A few hours later pain returns for 4-7 hours and then passes off leaving little disability. This after-pain is often very severe and is the only drawback of the treatment.

In figures published by the British Army where this method of treatment was used, it was shown that the period of incapacity was reduced from an average of 10-12 days to about 2½ days.

Theory

The theory developed by Leriche was based on the rich vascular and nervous networks of the joint. He believed that the joint had a sympathetic supply which was stimulated by trauma, so that a reflex arc was set up causing vasodilation of the vessels of the joint, with accompanying swelling and pain, etc. This swelling further stimulated the sympathetic reflex and thus a viscious circle was set up.

The procaine acts by blocking the efferent impulses, thus breaking the circle, and stopping the swelling and its associated effects.

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Pages from the Past

IMPURE AIR ENCOURAGES VICE!

"Vice, and habits of intoxication, are usually combined in the same individual. If, then, it has been already shown that impure air promotes drunkenness, it is also indirectly proved that the same cause has a considerable share in the encouragement of vice. The inhabitants of low, squalid, ill-ventilated basements and cellars, are often not only indisposed, but by incessantly breathing an impure atmosphere are actually unable to labor for their due support; add to this the mental debility, and extinction of moral sentiments, inseparable from a cellar life, and we at once arrive at one of the efficient causes of poverty, of low ideas of comfort, and of dishonesty, and prostitution; and as it is notorious that, in such places, intoxicating drinks are held in higher estimation than ony of the virtues, it is nothing strange to hear of modesty being set to sale for the acquirement of those drinks, which in their turn reciprocally produce every conceivable species of moral laxity.

The combined testimony of those who have taken the pains to investigate the causes of vice and prostitution, leaves no doubt that a low condition of body and mind, coincident with a marked irritability of the brain, so far from restraining the animal propensities and vicious inclinations, has no inconsiderable share in their aggravation and production; and this position being granted, ample evidence, it is presumed, has been adduced to show that the impure air of factories, theatres, over-crowded lodging houses, etc., is fully adequate to induce this state of constitution."

The Uses and Abuses of Air; Showing Its Influence in Sustaining Life and Producing Disease.

By John H. Griscom, M.D. 1850.

Abstracts

CRAWFORD B. SHIER, Editor

Contributors { R. C. Smith, R. L. MacMillan, G. R. Walker, J. G. Watt

COMPLETE LACERATIONS OF THE PERINEUM

An analysis of 205 Surgical Repairs

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Surgery, Gynaecology and Obstetrics, October 1939

A simple and effective method of repair is used and described, which was productive of almost uniformly good results in the hands of forty-one surgeons who performed the 205 operations, no one surgeon operating on more than 13 of the patients.

Pre-operative Treatment

This consists of a low residue diet for three or four days before operation and the use of soapsud enemas the night before and the morning of operation, both repeated until the solution returns clear. Violent catharsis is annoying, weakening and often harmful.

Technique

It is a variation of the original Emmet and Hegar method, and modified by Clark and Miller of New Orleans. The average duration of operation was forty-seven minutes, using general anaesthesia in 55% of the cases, spinal analgesia in 40% of cases, para-sacral analgesia in 3% of cases, and local analgesia in 2% of cases. Successive steps of the operation include: incision; complete excision of all scar and granulation tissue; separation of rectal and vaginal walls; isolation of torn sphincter ends; closure of rectal tear; approximation of sphincter ends; approximation of the perirectal tissues; repair of the levator ani musculo fascial sling overlying the rectum and conclusion of the perineorrhaphy. Colporrhaphy, plication of rectum, and other additions and variations are introduced according to the indications of the individual case.

Immediate repair of fresh tears and even primary or secondary repair of old lacerations should be done following parturition. If this is not done or is not successful, further attempt should be delayed for at least six months to permit proper involution of the parts; this removes complications due to excessive haemorrhage, extreme friability of the tissues, or post-operative infection.

Freedom from tension, careful asepsis and careful anatomical reconstruction are necessary to facilitate primary healing. Sutures must be carefully placed and not tied too tightly, and large masses of tissue must not be included within them.

Post-operative Treatment

This is directed towards the *prevention of infection* and *elimination of strain* on the newly repaired tissues. *Infection* is prevented by ordinary cleanliness and by routine perineal care after defecation and urination. External irrigations with warm saline solution, followed by drying lightly with sterile gauze is practiced, after which the operative site is painted with 5% mercurochrome solution. Vulval or perineal pads are not used in this operation. *Tension* is prevented by fastening the legs together until recovery from anaesthesia is reached or during any period of undue restlessness. Usually the first defecation is postponed for a week after operation, although some men believe in using mineral oil after one or two days. The authors believe there is very little to choose between the two procedures.

The patients receive liquid diet, without milk, for seven days, followed by soft diet for the next seven days, followed by the usual diet; opium pills gr. i, or paregoric dr. i, three times a day for five

days; mineral oil oz. i three times per day after the 5th day; epsom salts or citrate of magnesia as necessary after the 6th day. No enemas or rectal irrigations are permitted, and defecations are produced solely by the use of laxatives.

An ice cap wrapped in a sterile towel, applied immediately after operation, adds to the patient's comfort and prevents development of oedema. Later dry heat is used to promote healing. Hospitalization of at least 14 days is required.

Results

Follow-up was accomplished at intervals varying from six months to nine years. Late cures were obtained in 81.5% and failures were 6.5%. Six cases had immediate failure due to infection. Milder infection with no ill effects occurred in twenty-six other cases. Eight patients developed recto-vaginal fistulae, but surgical correction was required in only two cases, all the others closing spontaneously. Recurrence of the laceration is unlikely if proper precautions are taken in subsequent deliveries.

C. B. S.

A CONSIDERATION OF THE CAUSE OF THE ONSET OF LABOUR

Collective Review

D. H. DANFORTH, Ph.D., M.D., NEW YORK, NEW YORK, AND A. C. IVY, Ph.D., M.D., CHICAGO, ILLINOIS

Surgery, Gynaecology and Obstetrics, October 1939

The paper was written in an attempt to correlate the available data at the present time which may bear upon the problem of the onset of labour.

Nervous mechanisms are of minor or negligible influence. Gestation is likely maintained by progesterone and labour precipitated by estrone. The placenta is probably essential in regulating the proper concentrations of these hormones. Calcium is essential for uterine contractions, and thus the acid base balance of the body is an important factor, a relative alkali deficit favouring its activity.

There is some support to the belief that these autoacids, namely, the estrogenic and progestational hormones, produce sodium retention or retain fixed base; thus the interaction of these two groups of hormones may be capable of causing plasma alkali deficit and increased blood volume of pregnancy. Fixed base retention due to estrone influence is different from that due to progesterone, because only progesterone is capable of acting as a cortical substitute.

Thus through alterations in the metabolism of fixed base, which have been shown to occur, as a result of the influence of these hormones, the utilizable fractions of calcium and other essential ions might be altered secondarily and the motility response of the uterus so regulated.

This might explain the delayed response of myometrium to injections of oestrone and progesterone. It might also exhibit therapeutic measures more direct than the use of glandular extracts. Until a satisfactory method of estimating ionic calcium is evolved, the proof of these postulations will be lacking.

The precipitation of labour at term is due to many factors, such as (a) the increasing oestrone concentration in the face of apparently regressing progesterone levels, (b) the probable increase in active calcium, and (c) increasing distention, which invariably produces gradually increasing contractions in any hollow viscus.

C. B. S.

INTRASPINAL CAUSES OF LOW BACK AND SCIATIC PAIN

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Surgery, Gynaecology, and Obstetrics, October 1939

This is a review of 60 cases in which lumbar laminectomy was performed for the relief of low back and sciatic pain. Lesions low in the spinal canal were found to be the commonest single cause of recurrent pain in these areas where no bony

abnormality of the lower spine or pelvis could be found.

Etiology

(1) Herniated nucleus pulposus; 35 cases or 60%.
(2) Hypertrophy of ligamentum flavum; 13 cases or 20%.
(3) True neoplasms—3 cases or 5%.
(4) Negative surgical explorations; 9 cases or 15%.

Symptoms

Recurrent episodes of pain and exaggeration of this pain by compression of the jugular vein (Naffziger test) or coughing or sneezing are characteristic of the intraspinal lesions. Partial or complete impotence is frequently found in lesions compressing the sacral roots. Spasticity of the lumbar muscles is common and is usually accompanied by limitation of movement, especially in flexion. Segmental sensory changes are most helpful in localizing the lesion. Weakness of muscle groups and diminution of knee and ankle reflexes are also commonly found. Evidence of sciatic nerve irritation, as produced by flexing the thigh on the trunk, extension at the knee and dorsi-flexion at the ankle (Lasegue's test), is usually present at the time the patient is first seen.

Analysis of Findings

Pain was the disabling factor in 59 of the 60 cases. In the remaining case there was incontinence of bowel and bladder, saddle anaesthesia and trophic ulceration of the heel. Pain along the distribution of the sciatic nerve was the most useful aid in diagnosis, but in some cases pain was present only in the thigh, back or gluteal region. The pain was of an intermittent character, usually beginning as low back pain but later followed by sciatic pain.

In the cases of herniated nucleus pulposus, 60% were at the 4th lumbar disc and 37% at the lumbosacral disc. In 85% there was simple herniation through a small aperture in the annulus fibrosus. The remaining cases were either bilateral or the annulus fibrosus as well as the nucleus pulposes protruded into the canal. There was a definite history of trauma in half of the cases. In 60% of patients segmental hypaesthesia or anaesthesia involved the lateral aspect of the calf and foot. Diminution or absence of the ankle jerk was characteristically found, especially when the lesion was at the lumbosacral joint.

Hypertrophy of the ligamentum flavum was found between the fourth and fifth lumbar or the fifth lumbar and sacral laminae. In contrast with the preceding group libido and sphincter control were abnormal in half of the cases. Sensory changes were present in many cases but only 15% were limited to the lateral aspect of the calf and foot.

The neoplasms found consisted of a dermoid tumour in a man 59 years of age, a neurofibroma in a woman of 55, and an epidermoid tumour in a boy of 13. Progressively increasing, constant pain in the back and along the sciatic distribution was the dominant symptom in each case.

In the explorations which produced negative findings the likelihood of having missed a small herniated nucleus, especially through the intervertebral foramen, must be considered. The satisfactory surgical results in most of this group are explained by a simple spinal decompression.

Lipiodol Investigation

This should be done only if the neurological examination strongly indicates the presence of an intraspinal lesion, and if reasonable conservative methods have failed to relieve the symptoms.

A clear-cut unilateral filling defect opposite a disc indicates a herniated nucleus pulposus. The defect produced by a hypertrophied ligamentum flavum is more apt to be bilateral and opposite the vertebral body, producing an hour-glass type of constriction.

Surgical Technique

Following hemilaminectomy in the area of the suspected lesion, the herniated nucleus was removed extradurally through a small opening made in the

posterior longitudinal ligament. The remainder of the nucleus pulposus was also removed as thoroughly as possible. The articular facets were disturbed as little as possible.

If a greatly thickened ligamentum flavum was found the bony exposure was carried to the opposite side in order to remove it completely.

Results

In cases of herniated nucleus pulposus 26 showed excellent results while in 7 the improvement was slow, but the more severe symptoms had been relieved.

Very satisfactory results were found in 8 of the cases of hypertrophied ligamentum flavum. In one case a fatal meningitis developed after infection of the wound.

In the three cases of tumour growths two showed complete recovery. The third continues to have mild discomfort in the sacral region, probably due to incomplete removal of the dermoid tumour.

Four cases in which exploration was negative were immediately relieved. Six are free of symptoms at present, two are improved, and one is not improved.

R. C. S.

FAT EMBOLISM

R. I. HARRIS, T. S. PERRETT,
ANGUS MacLAUCHLIN

Annals of Surgery,
December 1939

Fat embolism occurs infrequently as a result of fractures and of operations upon bone. Its recognition is difficult as fat stains must be used on sections taken at post-mortem and in non-fatal cases the clinical picture is not clearly defined. At present the clinical evidence is a rather characteristic sequence of events as follows:—(1) An injury to or an operation on a bone. (2) A period when signs and symptoms are related only to the fractured bone, and (3) A period in which develop pulmonary and cerebral signs and symptoms, followed by death or recovery. Occasionally fat globules may be found in urine or sputum and when found are of great diagnostic value. Petechial hemorrhages due to fat emboli in cutaneous capillaries are rare but also of great help when present.

The pulmonary lesion both clinically and at post-mortem is easily regarded as pneumonia and only staining with scharlach R reveals the true condition of fat embolism with hemorrhagic exudate into the alveoli.

A case is reported which followed the usual course but it was noted that there was a profound fall in hemoglobin and red cell count of the blood, to such an extent that an internal hemorrhage was suspected. At post-mortem it was felt that these findings could be accounted for by the large amount of exudate in the alveoli.

Fat embolism is rare but is probably more common than supposed as it is difficult to recognize. In the last four years there have been twelve cases, six of which were fatal at the Toronto General Hospital. These cases are recorded in the article.

Experiments have been done on rabbits, injecting neutral human fat obtained at operation. It was found that 0.9 cc. per kilo was the minimum lethal dose when given at one dose. In repeated doses of 0.5 cc. the m.l.d. was found to be approx. 7.5 cc. per kilo. In these animals, however, although pulmonary signs appeared there was no appreciable fall in hemoglobin.

It was suggested that in humans the effect was due to hydrolysed fat and this was then used on rabbits. It was found that 0.07 cc. per kilo was fatal, i.e., less than one-twelfth of the m.l.d. of neutral fat. It is also much more toxic in repeated sublethal doses than neutral fat. Here again there was no significant fall in hemoglobin.

The changes are similar to those occurring in humans, namely, consolidation of the lung due to hemorrhagic exudate into the alveoli, and numerous fat emboli into the lungs, brain and kidney.

Mechanism of Fat Embolism:—Three things are necessary before fat embolism can occur:—(1) An accumulation of

fluid fat freed from its cellular envelope by trauma. (2) Open veins the open ends of which do not collapse. (3) Accumulation of fat under pressure greater than venous pressure so that it is forced into the open veins. Injuries to bone are more likely to provide all these factors than injuries elsewhere, as in bone the veins are held open by their attachment to the bony haversian canals through which they run.

Summary:—The object of presenting these cases is to call attention to the existence of this complication of fractures and operations upon bone. Though infrequent, it is of importance due to its high mortality. It is difficult to recognize and the most valuable means is the rather characteristic sequence given at the beginning of this abstract.

To these signs and symptoms one further sign has been added, namely, a profound fall in hemoglobin in an illness which complicates a fracture and follows the course outlined earlier. In the lung, brain, and skin the response to fat embolism is an hemorrhagic exudate. Those cases which are rapidly fatal or those in which the lung is not extensively involved will not show this fall in hemoglobin as there will not be sufficient alveolar exudate.

Conclusions:—

(1) Fat embolism is a more frequent complication of fractures and of operations on bone than is commonly supposed.

(2) It is difficult to recognize clinically due to the lack of specific and constant signs, and pathologically, because of the necessity of unusual staining methods.

(3) Points of value in diagnosis are: —(a) Rather characteristic sequence of clinical events. (b) Occasional presence of fat in urine, fat in sputum, and petechial hemorrhages into the skin, and in certain cases a profound fall in hemoglobin.

(4) The serious pathologic changes produced by fat emboli are probably due in part to the freeing of fatty acids by the action of tissue lipase.

G. R. W.

THE DIAGNOSIS AND TREATMENT OF HYPERTHYROIDISM ASSOCIATED WITH PREGNANCY

BERNARD PORTIS, M.D., Ph.D., MICHAEL REESE AND COOK COUNTY HOSPITALS; HAROLD A. ROTH, M.D., COOK COUNTY HOSPITAL, CHICAGO, ILLINOIS

J.A.M.A., Sept. 2, 1939

Hyperthyroidism associated with pregnancy may give rise to considerable anxiety as to the well-being of the mother, and the satisfactory continuation of gestation. The main features to keep in mind are the increased physilogic activity of the thyroid gland during pregnancy, and the variations in the clinical syndrome of thyrotoxicosis.

The thyroid gland undergoes hyperplasia and increases in vascularity during pregnancy due to the stimulatory effects of the thyrotropic hormone of the pituitary.

Clinical manifestations referable to the thyroid in normal pregnancy are few. There may be some nervous instability, and some pressure symptoms due to excessive size of the gland. The average normal rise in B.M.R. is + 33 to + 35 pe cent. There is often a normal basal rate in the first five months of gestation with a rise of 15 to 25 per cent later.

About 3 per cent of pregnant women show evidence of thyrotoxicosis, according to Bram, Frazier, Gardiner-Hill and others. The authors encountered only 1.4 per cent. The symptoms of established hyperthyroidism are similar in the pregnant and non-pregnant state, but the subsequent clinical course is often quite different from the usual progressive course of the disease. Hyperthyroidism may become worse or be ameliorated as pregnancy continues. The average age of the patients seen was 31 years. Gestation had been present 5 months. There were 4 primipara, and 10 multipara. 5 of the latter gave a history of previous hyperthyroid manifestations in earlier pregnancies. The symptoms were nervousness, palpitation, weakness, heat intolerance, and loss of an average of 5 pounds weight. There was thyroid en-

largement in all cases, nodular in 6, diffuse in 8. Tremor was present in all. Ocular signs were positive in 7 only. The average pulse was 94, average blood pressure 138/86, and the mean B.M.R. + 35.8. Ten were carried to term by conservative measures, two required thyroidectomy, one had a stillbirth at term, and the fourteenth suffered an induced abortion at the third month. In all the diagnosis was obvious.

It was noted that in a large number of cases, in which the patients were observed closely several months, that most remained stationary, while a few had aggravation or amelioration of symptoms.

Crotti advised against marriage in the presence of exophthalmic goitre, but if the patient is pregnant he recommends thyroidectomy before the pregnancy is completed. The milder cases can be brought to term without serious disturbance by careful regimen. Mussey, Plummer, Boothby recommend thyroidectomy in most cases of a hyperthyroid state during pregnancy. Mussey advises against thyroidectomy during the last six weeks of gestation even if there is visceral damage, and abortion is contraindicated because of the danger of precipitating a crisis. Marine and others advise small amounts of iodine during the first half of pregnancy as a prophylactic measure, because there is often an iodine deficiency in the diet.

J. G. W.

BLOOD SUPPLY OF THE MAMMARY GLAND

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SURGICAL CONSIDERATIONS BY JOHN A. WOLFER, M.D.

Surgery, Gynaecology and Obstetrics, October 1939

The mammary gland receives blood from two chief sources, namely, the *anterior perforating branches of the internal mammary artery*, and the *mammary rami of the axillary artery* itself, or one of its main stems.

The *former* form a transversely arranged series from the first to the fourth intercostal spaces. The *latter* leave the axillary fossa together; accompanied by the corresponding veins they form a small "pedicle" of vessels. Upon the breast the mammary vessels occupy the superficial fat level, being virtually subcutaneous in position. From these various mammary rami smaller twigs are given off at a right angle into approximately 2 to 2.5 centimeters depth of the gland. Anastomotic communications between neighbouring rami are common. None of the so-called medial mammary branches of the anterior intercostal arteries pierce the pectoral musculature to reach the overlying mammary gland; they terminate as muscular branches, leaving the deep or thoracic aspect of the gland devoid of arteries of gross proportions. Also, none of the pectoral rami of axillary derivation pass from the deep level through anterior appendicular muscles to supply the mammary gland. No vessels reach the gland from the inferior aspect but they approach the gland from the medical and supralateral aspects.

Operations should not only be planned from the viewpoint of ready approach to the lesion and cosmetic results, but also from the viewpoint of vascular elements of thoracic anatomy. This is not necessary in performing radical mastectomy, except in so far as complete hemostasis is concerned.

The common approach for removal of benign mammary tumours and cysts, especially those which occupy the inferior half of the breast, is through a curved incision, made at the junction of the inferior margin of the breast and the thoracic wall. In this way the resulting scar is out of sight and there is the least likelihood of producing troublesome bleeding. In removing the tumour or cyst, the operation should first follow the line of cleavage between the breast and the pectoral fascia, and then enter the breast itself directly beneath the tumour. Thus there will be less bleeding and minimal trauma to breast tissue.

In removal of tumours from the superior half of the breast, especially when the nature of the tumour is in doubt, the

incision should be made radially to the nipple. This again prevents to a marked degree severance of major blood vessels which supply the breast and results in less deformity.

Because of the concentration of blood supply in this superior half of the breast, there is good reason for severe haemorrhage from ulcerative lesions in that region, or when a deep seated abscess there is incised and a large vessel severed.

Plastic procedures designed to elevate a large pendulous breast can be carried out safely so far as blood supply is concerned because the inferior area has few vessels. For the same reason excision of breast tissue should be made from the inferior rather than the superior portion.

C. B. S.

THE COLD PRESSOR TEST IN PREGNANCY

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Surgery, Gynaecology and Obstetrics, October 1939

This article is of interest in that it reveals the limitation of this test, and the uselessness of it in the hands of the authors.

Vasomotor instability, as shown by labile blood pressure, is widely recognized as a characteristic of early primary hypertension. Emotional stimuli, in the hypertensive or even pre-hypertensive subject, often elicit marked rises in blood pressure. Several tests have been devised in which an effort has been made to standardize the stimulus. Hines and Brown have proposed the "cold pressor test", which measures the response of the blood pressure to the emersion of one hand in ice water. They state that pre-hypertensive patients give exaggerated blood pressure rises in the test, thus enabling the clinician to predict their eventual hypertension.

Many writers believe that the toxemias of pregnancy, exclusive of true nephritis, are related to primary hypertension. Corwin and Herrick believe that subacute hypertensive toxemia of pregnancy is the response of the women with latent or declared cardiovascular disease to the strain of pregnancy. It was felt, that if Hines and Brown were correct in their belief, then perhaps it would also enable one to detect patients likely to develop toxemia of pregnancy. This would be of great value in the study of toxemia and might be of benefit to the patient. However, the predictive value for toxemia of pregnancy is unsettled. The series studied have been small, and reproducibility of the response of the test has not been considered in most cases.

The response to the cold test is inconstant. While many patients do give reproducible rises in blood pressure, others have given highly variable responses at different times. According to the authors, this response is independent of family history of cardiovascular renal disease and diabetes. It is also independent of age, gravity, weight, weight-height index, weight gain in pregnancy, and perhaps also the basal blood pressure.

The incidence of toxemia was the same in both normal and hyper-reacting groups. The frequency of distribution of responses is essentially the same in both pretoxaemic and prenormal groups.

C. B. S.

Book Review

SHORT YEARS

By ARCHIBALD MALLOCH

Normandie House, Chicago, 1938. 343 pages, $3.50

"My Dear Miriam: . . . . I think that I was a sailor once a long, long time ago and beat about in an open sea for years and years till the song of the winds was a part of my life, and the whisper of the waves at night made up my dreams. I think our ship meant to land on an island in the middle of the sea where you lived, ..."

This was John Bruce MacCallum the dreamer. He was "a gentlemanly, modest, lovable person, with a productive mind that attained to pure genius." Following in the footsteps of his brother, W. G. MacCallum, the pathologist, he graduated in Arts in 1896 from Toronto, and in Medicine in 1900 from Johns Hopkins. A brilliant scientist, a poet and a dreamer, he wrote a large part of his own biography, no doubt unwittingly, in his letters to his home, his brother, and his friends.

Amongst his thoughts on leaving the University of Toronto in 1896 one finds: ". . . . It was a most beautiful sight, the great square tower with its millions of shadows, and quaint faces grinning in the moonlight. A picture I shall never forget, so grand and inspiring did the old building look, and when I thought of leaving it forever, my heart ached, and I believe that my eyes were filled with tears at the sadness of it. . . ."

From Johns Hopkins in 1899 he wrote: "Dear Home: . . . . We have only ten days more of medicine and it seems ridiculous that I have learnt almost all I am going to of medicine before I graduate. . . . I have enjoyed the medical wards very much although truly medical people don't know much what they are doing. . . ."

Ever doing some piece of original research, he still found time for his frequent letters: "Dear Father: . . . I have been doing some work on my own book on the intestine in embryonic pigs which has turned out rather satisfactorily. . . ." His fundamental studies on cardiac muscle, on the development of the intestine, and on the physiologic action of cathartics have justly placed him in the foremost rank of medical scientists. Even before his graduation he received faculty recognition: "Dear Wil (W.G.M.): Dr. Osler told me that they had had a meeting and appointed you an associate in Pathology and me an assistant in Anatomy. . . ."

But although his mind and spirit were strong, he was afflicted with tuberculosis in his clinical years, the first pleuritic attack occurring while on a visit to Toronto in 1899. It became necessary that he go in quest of health. Still he continued to work and from Denver Medical School he wrote in 1902: "Dear Miriam: . . . Always before the students had treated the dissecting room as a sort of barn that they could do what they pleased with and smash up as they liked, so I deliberately put all the best plates and pictures I could find on the walls and all the most breakable things around the room and as I expected, their souls expanded a degree. . . ."

In 1903, Loeb the physiologist reported of him: "MacCallum is doing very well and developing into the strongest physiologist this country has produced. . . ." And so from the University of California he wrote: "Dear Home: . . . just a note to tell you that I have just been made Assistant Professor of Physiology. . . ."

But ever the tuberculosis gained headway, and finally in 1906 it won out. One wonders what might not have come from this brilliant mind had he been spared. Malloch weaves the story very effectively around MacCallum's own letters, which constituted the greater part of the book. Every physician and student should read this fine biography, for to gain even a little of the spirit of this man is to gain one of the finest things of life.

F. L. L.

Feature Section

F. L. LAWSON, Editor

"WHAT SHALL I CHARGE?"

By JOHN HAROLD COUCH, M.A., M.B., F.R.C.S. Edin., F.R.C.S.(C.)
Department of Surgery, University of Toronto

The numerous requests from final year students and internes for suggestions as to reasonable remuneration for their services indicates that this problem troubles most doctors at some stage in their career. The constantly recurring joke about the doctor who admitted he once made a mistake when he diagnosed appendicitis in a patient who could have afforded a gall bladder indicates that the trouble is not confined to the first year in practice.

Since the jokes of an age merely caricature the life of that period, there is probably a grain of truth behind these observations. Many doctors charge "just what the traffic will bear." Some successful practitioners may be more adept at palpating the pocket book than they are at palpating the spleen.

Some fair and honest schedule of prices should be set down easily but unexpected difficulties arise when this is attempted. In dealing with human life it seems hard to reach a basis from which to start. There are, however, several means of arriving at a schedule of fees, based on different view points. Each has some advantages and some disadvantages. As each graduate goes into practice, he must arrive at some plan for himself and base his charges on a consistent, even though illogical standard.

1. Charge What the Traffic Will Bear

Perhaps the commonest system of fees is that by which the doctor charges whatever he thinks he can get. Obviously a very faulty scheme. The doctor has no way of telling exactly as to a patient's circumstances.

There is something almost dishonest in charging one patient twice as much as another for the same job. If it is worth $200.00 to one, it should be worth $200.00 to the next. But we charge the rich ten times what we could afford to do an operation for, because we must do the next nine for nothing. Dick Turpin also robbed the rich to give to the poor and came to an unfortunate end. The days of taking from the rich to give to the poor are past—except when the Government does it in taxes.

From the rapier pen of the old iconoclast, G.B.S., comes the comment to the effect that any grocer who charged $2.00 for a pound of butter because the customer had a Packard car, gave it for nothing to the man who was out of work, and charged the rest anything in between these prices, would find difficulty building a reputation for impartiality and fair dealing.

The surgeon who tells the poor patient, "Oh never mind paying, I'll get it out of the next man," should, in all honesty, explain the situation to the next victim and ask his permission to spread the said victim's money around. Most people like to choose their own charities.

The habit of varying our charges with the social status of the patient is, unfortunately, deep-rooted and has ample traditional support. More than 2,000 years before Christ, Hammurabi of Babylon drew up a schedule of fees for surgeons, with such variations:

"If a physician operate on a man (meaning a nobleman), for a severe wound (or make a severe wound upon a man) with a bronze lancet and save the man's life; or if he open an abscess (in the eye) of a man, with a bronze lancet, and save that man's eye, he shall receive ten shekels of silver.

If he be a free man he shall receive five shekels.

If he be a man's slave, the owner shall give two shekels of silver to the physician."

Hammurabi was of legal turn of mind and so went on to add clauses which might well discourage hasty or hopeless surgery. If, as a result of operation, the man lost his life or his eye, the hands of the surgeon were to be cut off. Later, schedules of fees have been drawn up by doctors and failure carries no penalty except the self recrimination of conscientious surgeons, who, of course, would not be doing rash surgery anyway.

In more recent years there is a tendency to recognize that the old principle of giving "value for value received" is still sound. There seems something not quite right in charging a patient just as much for a bad result as for a good one. Obviously, the patient did not get what he tried to buy. The schedule of Ontario Workmen's Compensation Board indicates this historic changing view point as they specify,—"A proportionate part of from 50% to 75% of fee will be paid in cases terminating fatally within 7 days"; and again "In case of multiple fractures, the fee covering the major fracture, plus 50% of fees for additional fractures will be allowed."

2. Charge a Certain Percentage of Income

In order to overcome the difficulty presented by the inequality in the number of dollars possessed by the different members of society, one may recall the fact that cash is only a convenient means of exchanging work or commodities. Patients may then be charged in terms of work. Instead of saying "the price is $200.00", we might say that "the price is 10% of your yearly income." This is probably a more just system and it is the basis of the charges made at the Mayos' and some of our larger clinics.

But the man of independent mind is likely to resent enquiry as to his work and income. He would be entirely correct to point out that the amount of his income is none of the doctor's busines; and to intimate that he expects to be charged a fair price and will endeavour to pay it. He does not want to be exploited if he has a large income nor to be pampered if it is less than average.

Furthermore, this system breaks down in the upper income brackets. The shipping clerk on $15.00 a week may be pleased to have his appendix removed for $75.00 but the general manager of the same firm, earning $15,000.00 a year will probably refuse to pay $1,500.00 for the same thing.

3. Charge According to the Skill of the Doctor

Someone has defined a professional man, including a doctor, as—"a man who gets paid for trying." If this were so, all doctors who try equally hard should be paid equally. Obviously such a situation would be absurd and, in truth, it does not exist. With very few exceptions, all doctors do try equally hard. All doctors bring to every patient the best judgment and ability of which they are possessed. And yet there is a wide range in charges. Furthermore, all doctors try just as hard for the poor patients as for the rich, yet the fee may be very different.

The suggestion that the size of fee should vary with the skill of the doctor is excellent and will find increasing place in the future. At present it is impractical for various reasons. In the first place, patients have no way of telling which doctor is good and which is not. From the point of view of a large practice, it does not matter whether the doctor is good or bad. It only matters whether the public thinks he is good or bad.

If fees are to vary with the skill of the doctor there must be some real gradation in skill and some means to permit a patient making an accurate choice. The time may soon come when more advanced examinations will be held before a man is permitted to call himself a specialist; and it would be desirable also if all doctors were compelled to pass an up-to-date sensible examination every 5 years in order to have their license renewed.

As it is now, patients have no reliable criteria by which to choose a good doctor. Sometimes they get the cart before the

horse so that their estimate of ability varies with the fee, instead of the fee varying with the ability. Recently a senior member of a Grade A teaching hospital in the United States quoted a fee of $100.00 to a man in moderate circumstances. The patient went fee-shopping, as they so often do in these times, and was quoted $350.00 by a man whose self-confidence was only exceeded by his ignorance. They chose the latter because of the larger fee, saying unto themselves "An operation is a serious thing—we must have the best."

4. Charge a Fair Return on the Investment

The Ontario Medical Association conducted a review a few years ago which demonstrated that it cost about $20,000 to graduate a doctor. This is made up of actual out-of-pocket expenditure plus what money the student did not earn but could reasonably have earned in the open labour market for one of his age. It is well known that a student's fee does not pay the cost of his medical course. But the money which the government spends on each medical student is not included.

A doctor should reasonably expect a return of 5% per annum interest on this $20,000 invested money which amounts to $1,000. He should expect also to amortise his investment over his lifetime and since the average doctor has, at the outside, 40 years' service, he must return $500 per year of principal if he is to get back his $20,000 investment by the time he dies. Certainly his ability and knowledge depreciate to nothing at his death. His widow cannot sell his judgment nor his technical skill.

He is, in addition, entitled to a reasonable wage for his further efforts. The amount of this wage seems to puzzle some people. A skilled carpenter in England puts in seven years apprenticeship learning his trade. This is about the same amount of time as a medical student puts in if one year for interneship is added.

The Philadelphia Court Assistance Board is reported to have published recently a scale of fees showing how they value the various callings. A skilled bricklayer is allowed $1.79 per hour; iron and steel workers get $1.65 an hour; ordinary bricklayers, marble setters, polishers, plasterers range down the scale and finally we come to the group including air-compressors, dredge operators, power shovel operators, pump operators, architects, statisticians, doctors, and lawyers. This group is allowed $1.51 per hour.

If we assume that the doctor works on the basis of a 40-hour week with no extra pay for overtime, this figures out to $3,140 per year. So that if he is to do as well as a plasterer, the doctor should take in each year the sum of these three items added together. Interest, return of principal, and wages should add up to $4,640 per year. An income of any less than this amount suggests that the man would have been better off financially had he never paid the cost of becoming a doctor but had apprenticed himself out to a bricklayer at the age of 14 years. Paul Harrison of Arabia once observed that the average yearly income of the members of his graduating class after 10 years in practice was about $1,200. Maybe they chose the wrong calling.

And yet in spite of all the inconsistencies and superstitions connected with the position of the doctor in the community the present generation of students will soon be turned out to find their places in a sane and helpful way. They will be well advised to use one of the fixed schedules now available as a start and modify slowly from that, as seems wise.

The Ontario Medical Association schedule is comprehensive and fair. It is for good general practitioners rather than for specialists and therefore can take no cognizance of the difference in skill. Nor does it allow for variation in the social status of the patient. It is an average fee for an average doctor working in an average community. The Compensation Board Schedule will form a guide to the charges which should be made in the case of labouring men for whom it is drawn up.

Furthermore, the young doctor going into a district would do well to make use of a little psychology until he has estab-

lished himself. It is human nature to resent change so that any newcomer starts out under a slight handicap. The older doctors have the confidence of the people and may be seeing them at 50 cents a call, including medicine. The young man with modern training may reasonably expect his share of the work as he gradually wins his place in the hearts of the people for he is able to bring them valuable aid once they can be persuaded to let him do so.

Nor should he be primarily concerned with the income aspect of practice, but rather should he strive to labour faithfully and to the best of his ability in all cases. The truism that "the labourer is worthy of his hire" is just about as true as it ever was and may give assurance to the young doctor that he will ultimately receive about what he is worth.

SURGERY OF THE HAND

by

JOHN HAROLD COUCH, M.A., M.B., F.R.C.S. (Edin).

Department of Surgery, University of Toronto
and
Toronto General Hospital

Not only is this book a useful text for undergraduates but it is a clear and authoritative guide for practitioners, which, if followed faithfully, will lead to a great reduction in the suffering and subsequent disability that results from injuries and infections in the hand.

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Medical Society Notes

By PAGE STATTEN, Secy.-Treas.

With the term passing smoothly and the weekly meetings of the Medical Society Executive running with customary efficiency, we will note a few highlights from the Minute Book.

Dr. Erb's address to the Open Meeting of the Medical Society was most interesting and was well received by the student body; a committee has been appointed to investigate the question of an Annual Banquet for the medical undergraduates; the Society is considering insurance of overcoats left in the medical buildings; Bert Niosi is the likely band for the Meds At-Home; it has been decided that Daffydil (in revised form) will be presented again this spring.

Congratulations are in order for those members of the Medical Faculty concerned with the formation of the Board for Intern Appointments. We understand that the students using the service are with few exceptions, "happy about the whole thing". With considerable conflict between student bodies on the campus, (C.S.A. and N.F.C.U.S.) it was decided that the Medical Society could best devote its energy towards its own offspring—the C.A.M.S.I. Thus it was decided that no representative would be sent to the conference of the C.S.A.

Remember the Meds At-Home, Friday, January 26.

Medical Athletics

By D. R. CLARK, Secy.-Treas.

The advent of a new year introduces a new group of interfaculty sports. It is to be hoped that we meet with as much success this term as we did last term for we are still definitely in the race for the T. A. Reed Trophy.

The spring term sports include swimming, basketball, baseball, waterpolo, boxing, wrestling, fencing, and badminton. Of this group, swimming is a carry-over from last fall's activities. The junior swimming team splashed their way to the junior interfaculty championship. This team plus the swimmers from the upper years should be among the favourites to win the senior title.

This year, Medicine is again entering four basketball teams in interfactulty competition. This entry includes two senior teams, chosen from the upper four years, one junior team, chosen from the lower two years, and a fourth team picked from the entire six years. With this entry, some forty men have the opportunity of playing in the "hoop series".

Due to the increasing popularity of baseball, Meds. are increasing their entry this year to three teams. There will be a senior, a junior and a third team. This third team will be chosen from the entire six years after the first two teams have been chosen. In recent years the baseball teams have proven to be definite point earning organizations and it is hoped that the new team will prove the same.

Waterpolo again presents the possibility that the junior and senior teams may meet in the finals. Last year's junior team plus some strong swimming freshmen should be able to end up at the top of their league. The success of the senior team depends entirely on the cooperation of the men who have played on former teams. There are men who have played on intercollegiate and interfaculty championship teams in the upper years and it is to be hoped that these men will turn out and try to bring this championship back to Meds.

In the Medical Athletic Notes of last month, mention of the inauguration of a Badminton team was made. Due to the difficulty in obtaining the court for practice, it will be left to the individual players to practice when convenient. The interfaculty team will be selected from a one or two night elimination tournament. Watch your bulletin boards for notices of this tournament.

Warning—There is a fine of 100 points and $3.00 levied on a faculty for the default of any league game. *Players*—keep an eye on *The Varsity* for schedule announcements. *Managers*—keep in touch with the men of your team. We cannot afford to lose the points gained by other teams.

M. W. U. A. Notes

By MISS HELEN HOLDEN

Our season opened with the Initiation held at the Women's Union early in October. A formal candle-lighting ceremony was followed by skits put on by First and Second Years. Second year are to be congratulated for a very pleasant evening. We also welcomed our new honorary president, Dr. Marjorie McIntyre, at this meeting. Later in the month the Medical Women were entertained by Dr. McIntyre at afternoon tea. The next activity was a tea at the School of Nursing where we had as our guests of honour, Mrs. Gallie and Mrs. Wallace, the latter of whom gave an interesting talk on the history and organization of the Red Cross and its war work.

Late in December we had a Christmas party in the Medical Building common room, which was decorated very effectively, and a substantial supper was prepared, after which all enjoyed Santa's visit and carol singing. The presents and tins of food which we all brought were then taken to the University Settlement.

The Athletic Society commenced the year very successfully with Miss Marjorie Mosbaugh's success in the University Golf Tournament. This was followed by the Interfaculty Tennis Tournament in which Miss Mosbaugh and Miss Mary Hollington were the most successful entrants. Marjorie obtained a place on the Intercollegiate team which played at Queen's. Other members of our team were Miss Dorothy Prowse, Miss Helen Holden, Miss Helen Grady, and Miss Mary Alexander.

Soon after the tennis season, basketball began. This year we stood second in our group, the other members of which were Household Science, Nurses and Vic. Juniors. The team members were Misses Dorothy Prowse, Marjorie Mosbaugh, Jo. Shelton, Helen Holden, Jean Meinus, Mary Alexander, Marg. McFarland, Mary Hollington and Mary Wall.

Plans are now under way to enter teams in the Interfaculty hockey, badminton, and ping-pong tournaments.

C. A. M. S. I. Notes

By A. J. DENNE

The most important accomplishment of C.A.M.S.I. this year has been completed recently with the announcing of Intern appointments for the graduating class of 1940 in the various Medical schools whose members made use of the C.A.M.S.I. sponsored Canadian Intern Board. As far as we can ascertain, the system worked very well with the prospective Interns getting the best appointment open to them, whilst the hospitals received the applicants who desired most to work in them. A complete report and comment will be published in these pages at a later date so that the obvious merits of the Canadian Intern Board will be apparent to all concerned. To the C.A.M.S.I. representative on the Board, Mr. William Kerr, and also to Mr. Paul McGoey who helped lay the foundation work for the Board, we would like to express appreciation for the many hours of hard work and the energy which they have put into this enterprise. It is our personal opinion that the Canadian Intern Board will become a most important link between hospitals and Interns for the great advantage of both.

Your local C.A.M.S.I. executive regrets that no open meeting was held last term. However, plans are under way to hold one before the national Convention is held at Kingston. It was decided that an open meeting would have little value until tentative reports from various committee members had been rounded into shape to present to such a meeting. These reports will deal with problems of tuberculosis, student health, publications, etc., which were begun last spring and fall.

At an executive meeting held in December, the formation of a sub-committee of the Medical Society for the local C.A.M.S.I. was approved and a formal adoption by the Medical Society as mentioned in the last issue is eagerly awaited. We personally believe that the mutual benefits of such an arrangement will have far reaching effects for Toronto Medical students.

Before closing we would like to thank the American Association of Medical Students for again sending their Journal to Toronto. It is entirely a fraternal gesture on their part as there is no charge to us at all. The broad aims of their association are similar to our own and thus many of their doings are of interest to all Canadian Medical students. For the last two years many difficulties have arisen in connection with collecting and distributing the J.A.M.S. but after the New Year all back issues will have been distributed and the rest will be placed in the Medical Building and the Toronto General Hospital as soon as they arrive.

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